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**HOW
AND
WHY**

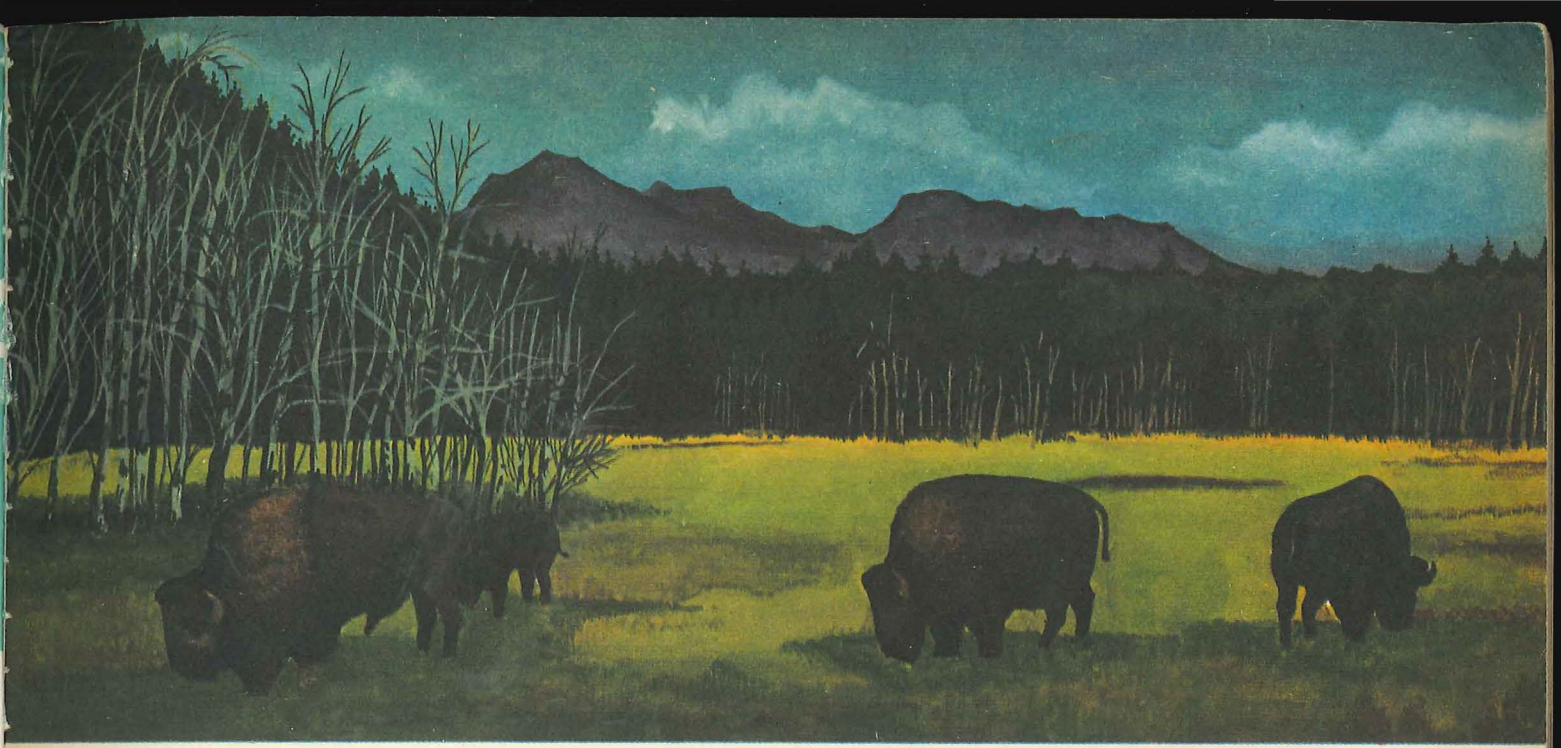
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THE SPOILT EARTH







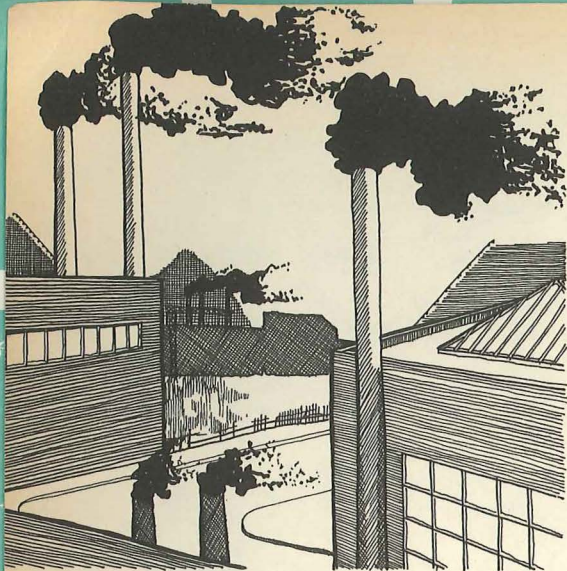
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THE HOW AND WHY WONDER BOOK OF **THE SPOILT EARTH**

Written by JOHN GOODERS
Illustrated by ALAN JONES
Cover by MIKE CODD

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Introduction

At present, the world's human population is 3,500 million. This is already more than the planet can support. By the year 2000 the number will have doubled. How can man survive? Survival means conservation – of all forms of life on planet Earth. Although the Earth seems huge only a small fraction of it is used to support life. This part is called the biosphere and it reaches to seven miles below sea-level and about five miles above, apart from a few bacteria which float higher.

Until man arrived, everything worked out well with nature in command. Man, however, started to alter what he found in order to make life easier for himself and as he discovered more and became more competent, so his numbers increased. He started to use the land for food instead of hunting for it as he had previously done. Forests were burned to make way for grazing land for the animals man had tamed. Eventually, in the middle of the nineteenth century, the industrial revolution came and an accompanying deterioration of the environment together with a population explosion. Since then, more damage has been done to the environment than in all the previous years of man's existence put together.

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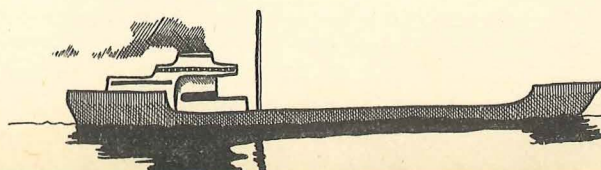
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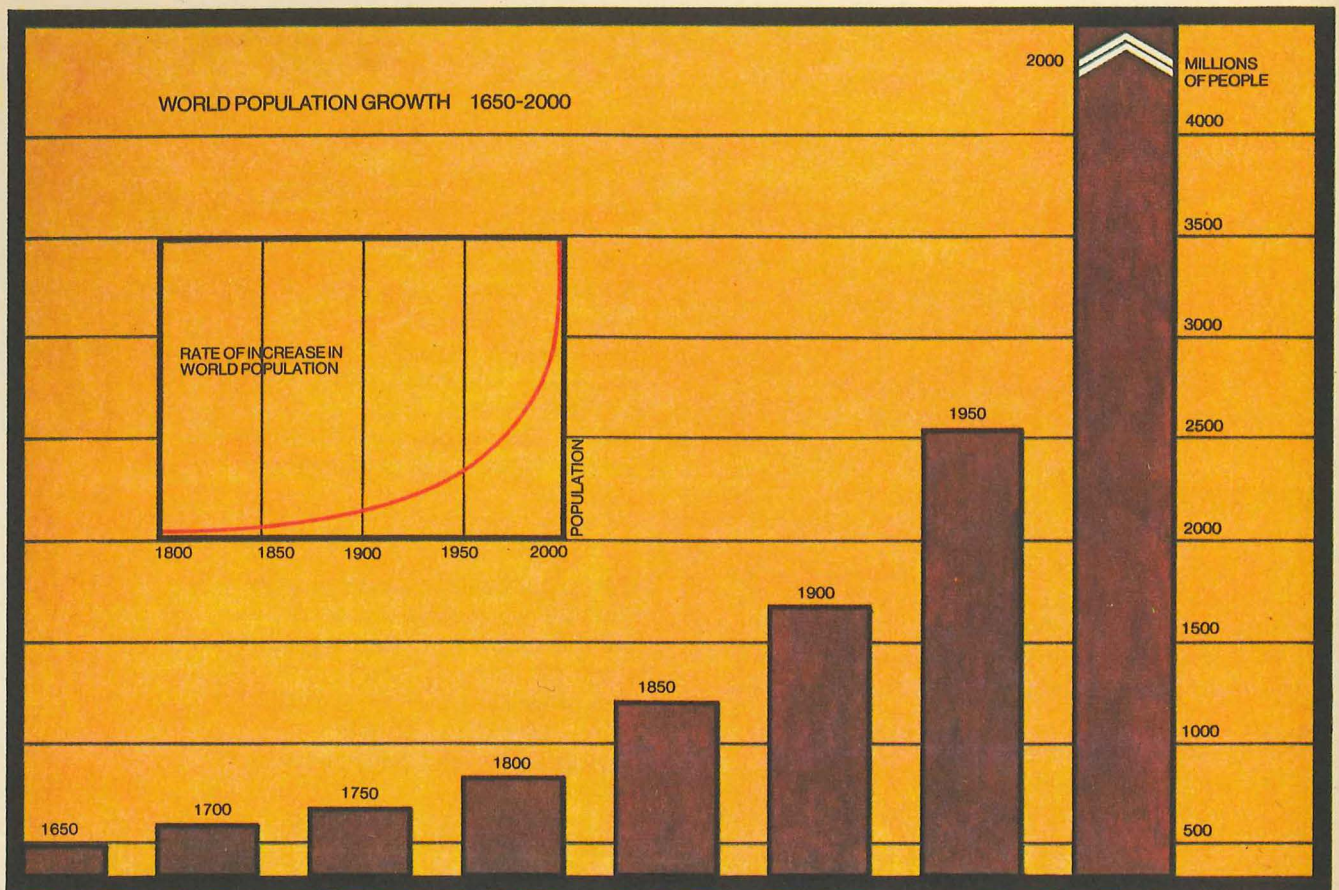
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CONTENTS

	Page		Page
THE PROBLEMS	4	Can pesticides affect breeding?	25
What is life?	4	What are the results of the use of defoliants?	25
How do we treat planet Earth?	5	Can animals resist pesticides?	26
What effect does our treatment of Earth have?	6	Can DDT kill man?	27
How harmful is over-population?	7	Are refuse heaps dangerous?	27
Must we control our discoveries?	7	How could we dispose of refuse?	27
Why is conservation important?	8	Should we reject pre-packed foods?	28
EARTH - A DYING PLANET	9	POLLUTION OF THE WATER	29
What is the result of pollution?	9	How important is water to life?	29
What has man already destroyed?	10	How do we pollute the seas?	30
Is man's future secured?	11	What damage does oil pollution cause?	30
Why is the Earth dying?	12	How widespread is oil pollution?	31
How does man destroy the planet?	13	How does oil kill birds?	31
Can we halt the trends?	13	Does oil pollution have other effects?	32
POLLUTION OF THE AIR	14	How can we get rid of oil at sea?	32
What causes air pollution?	14	Are there many other pollutants of water?	32
Can aircraft affect the atmosphere?	14	Are rivers seriously polluted?	32
Does industry cause pollution?	15	How do poisons affect water-life?	33
Do cars cause pollution?	15	Which parts of the oceans are polluted?	34
What effects do car exhaust fumes have?	16	What is eutrophication?	34
How do power stations pollute?	17	What are 'run-off' pollutants?	35
Is overcrowding in cities dangerous?	17	Are metals dangerous?	36
Can air pollution affect land and sea?	18	What is Minimata disease?	37
Does wildlife suffer?	18	How can metals affect our food?	38
Can plants show us pollution?	19	Is dumping at sea safe?	39
Does wind spread pollution?	19	Does man make other huge mistakes?	40
Does man need wildlife?	20	Is any place uncontaminated?	41
What about radioactivity?	21	Why must we preserve our water?	41
Why is air so necessary?	21	THE FUTURE OF PLANET EARTH	
POLLUTION OF THE LAND	21	How dominant is man on Earth?	42
How much do we need the land?	21	Can man survive?	42
How does the soil work?	21	Should we alter the landscape?	43
How is a dust-bowl created?	22	What effect does hunting have?	43
What effect does clearance of woodland have?	23	How can man improve the planet?	43
Should we leave the land alone altogether?	23	What can the individual do?	44
What happens if we change the Earth's surface?	23	Is nuclear power the answer?	45
Are pesticides beneficial?	24	What does radiation do?	45
How do persistent pesticides work?	24	What is the future?	45
		Can the Earth survive?	46





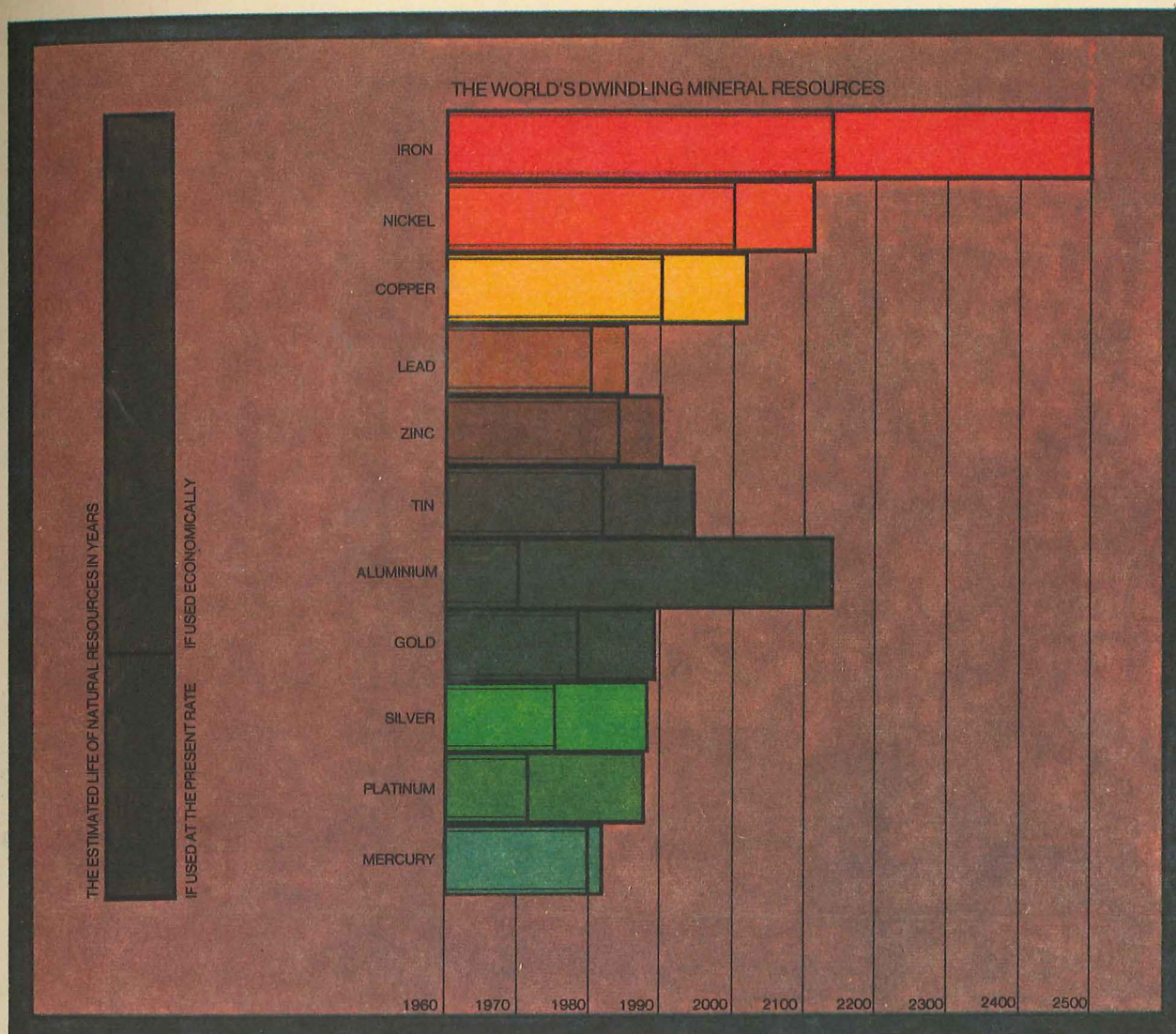
The more people there are, the more pollution there will be.

The Problems

Modern man has a very peculiar attitude towards his own life.

What is life? Unlike other animals and primitive man he considers it as a special event with a beginning and end—birth and death. He does not see it as part of a continuing process in which the individual is a fractional part. Man is brought up to dislike death and anything associated with it. Carrion-eaters such as vultures are considered distasteful and persecuted, although they do a valuable job of cleaning-up. But death is essential to life—life cannot exist with-

out it. This applies to all animals and plants. Without death there can be no future generations as there would not be enough room for them. Yet modern man is the only life form that tries to prolong natural life. This is the major cause of over-population which will itself lead to death by famine and plague. We do all we can nowadays to stop people from dying while at the same time we say how concerned we are at the population problem. We must learn to accept death for what it is—an essential part of life. We can learn from other animals.

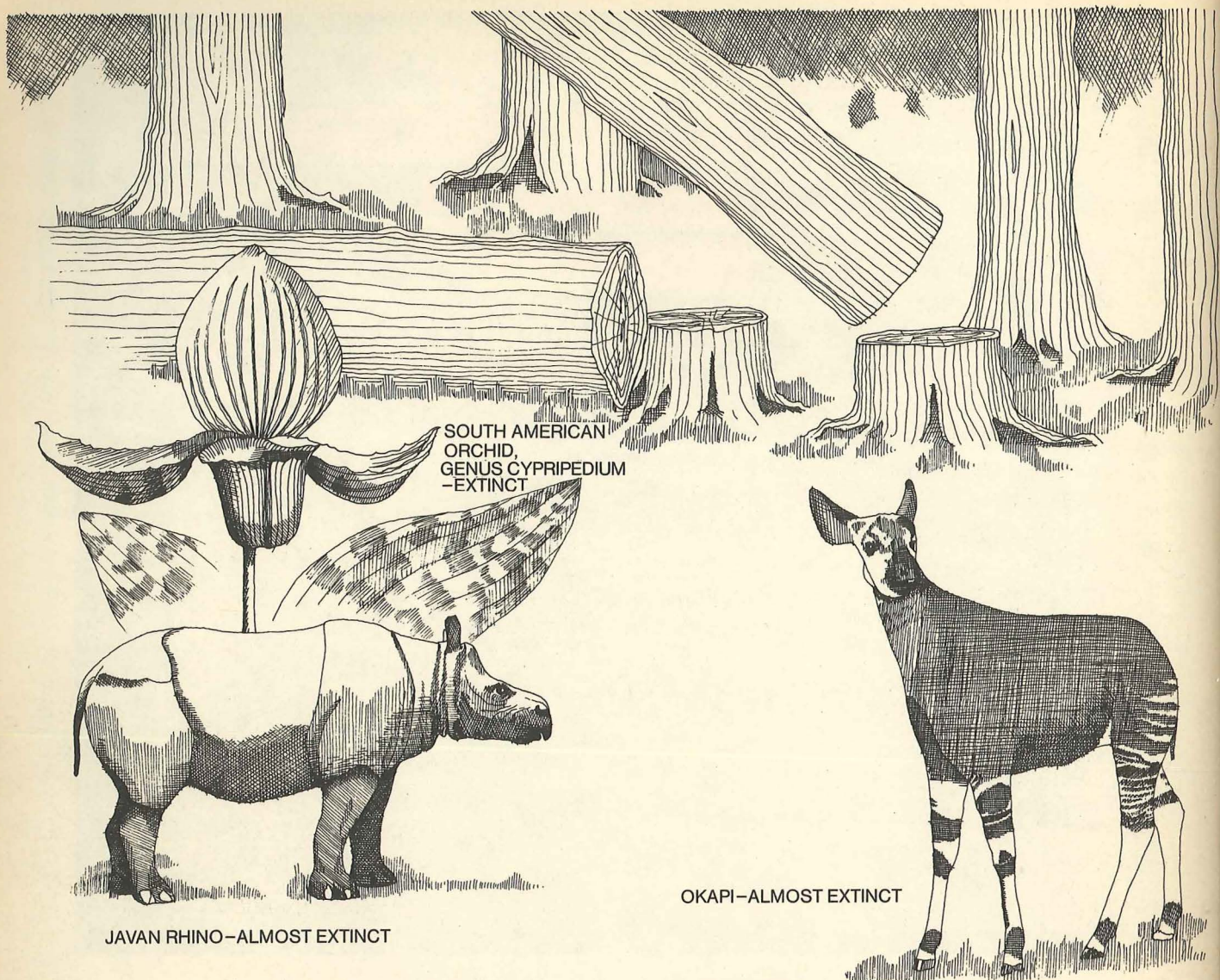


We are running out of all essential resources.

A tragic result of our population explosion and of our increasing knowledge of the planet and what it holds is the rapid using-up of the Earth's resources—minerals and fuels. What we are now doing is using up all our fuel and metals, destroying our soil and poisoning the planet with pollution of all kinds. Metals such as copper, tin and lead are already almost completely

How do we treat planet Earth?

used up. If we continue to take so much out of the Earth without putting anything back the Earth will just collapse as a planet that bears life. Every new child born in the 'developed' countries demands so much of the Earth's resources. This is particularly true in the United States and Europe, much more so than in China or India where the standard of living is much lower, but much less demanding on the Earth.



Every time we cut down a forest or plough up land, we destroy a place for an animal to live and a plant to grow.

All of our actions have an effect on wildlife, whether we intend it or not.

What effect does our treatment of Earth have?

By destroying forests we are taking away the habitat of all the creatures which live there. Many will not be able to find another place to live or, if they do, will not be able to find an unoccupied territory in which to start a new home. They will therefore die. Plants are automatically destroyed. We have made extinct many different animals and plants, all of which were part of nature's plan and had a useful

function to perform. Many, many more are threatened with extinction by man's activities. The big cats, such as the Leopard and Jaguar, have been hunted to virtual extinction because of the social prestige of possessing a fur coat. No good comes from this but financial profits are huge for those who deal in the skins of such magnificent animals. All of these forms of life should share the Earth with man so as to make sure that a natural balance continues to exist on the planet. We might say that nature looks after things better than man can.

If we look at the effects that man has had on himself in his continuous efforts to rule the planet the picture is not very promising.

How harmful is over-population?

By discovering things but being unable to understand and use them properly he has created much wasteland and also driven himself into little pockets of civilisation which he calls cities. By over-population he has caused problems which he cannot solve. The physical effects on man are many, ranging from starvation to complex diseases involving poisoning from metals such as lead and mercury. In all large centres of civilisation there are great problems in the way in which people are forced to live. The technological age has produced an easier way

of life but one with more worries, for example, over work; the need to acquire more goods; and there is in every major city and town an obvious increase in crime, suicide and all kinds of mental illness. Over-population and the resulting urbanisation—people crowding into cities to find work, money and a particular standard of living which they have been told to strive for—are the causes.

The danger of doing things without control and without thinking of the long-term effects is one thing we seem to have overlooked. When the properties of DDT were discovered—especially those concerning its insecticidal uses—the

Must we control our discoveries?

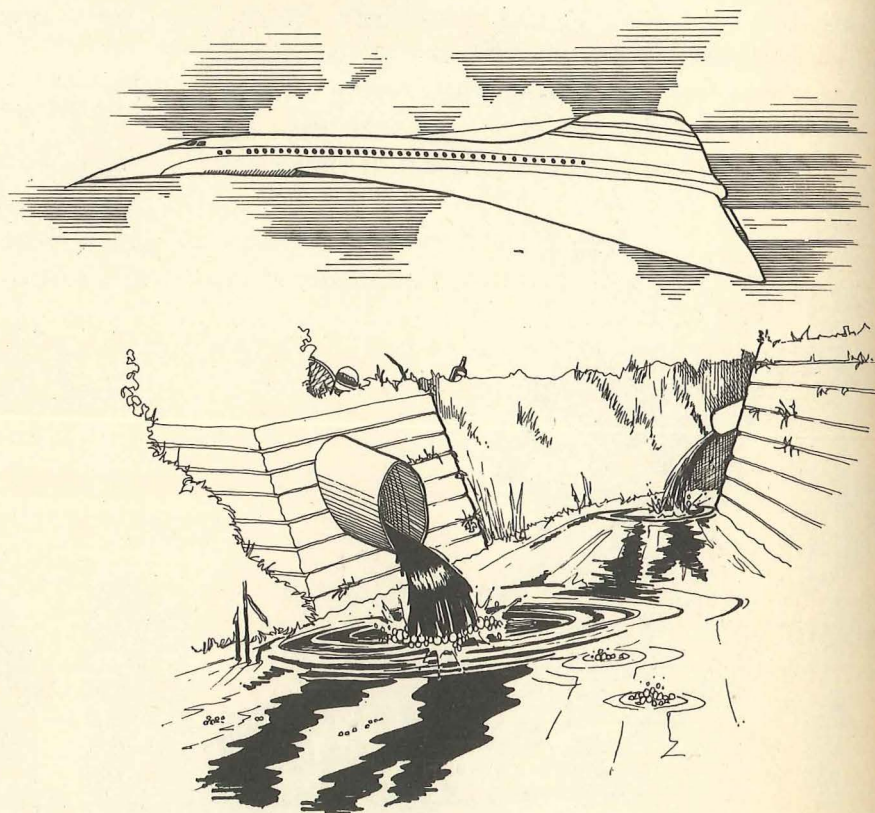


People flood into cities faster than places for them to live can be built. Every city has overcrowded, slum sections with people having to live in houses not fit for habitation.

discoverer was awarded a Nobel prize. Yet twenty years later the use of DDT was banned in many countries (though not enough) because its harmful properties were seen to be greater than its useful ones. But even now man still explodes bombs in tests, thereby upsetting all forms of life for hundreds of

miles around, in the sea, on land and in the air. He still uses dangerous pesticides and pours poisonous waste products into rivers and seas. Man still produces bigger and faster jet planes to upset the Earth's atmosphere and produce more cloud cover, thus changing even the climate.

Every new technical advance poses problems.

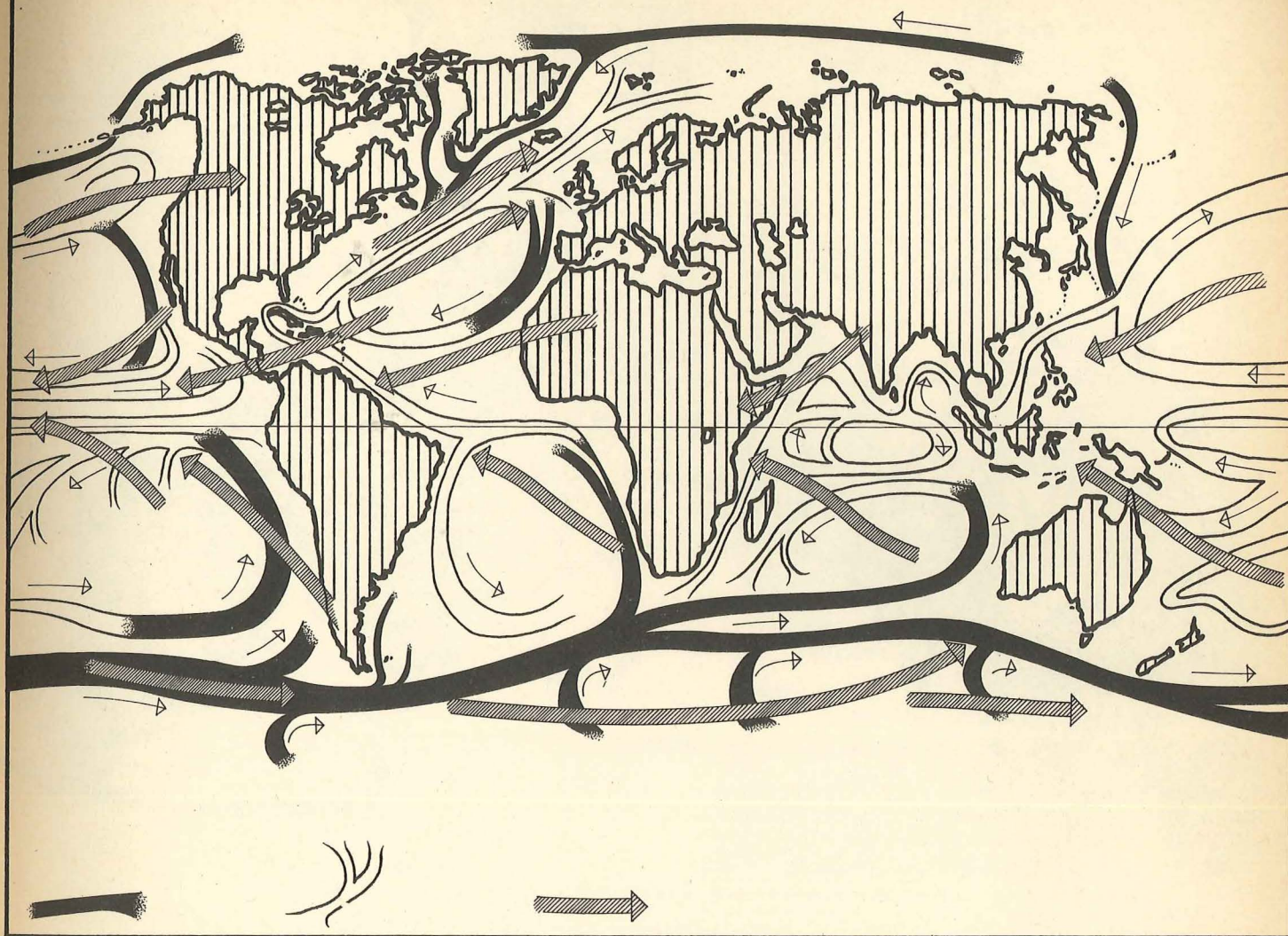


Firstly conservation does not mean just preserving wildlife at the expense of man.

Why is conservation important?

It is far more. We should be concerned with conservation of the planet as a whole unit. This means conserving all our natural resources, everything that exists in the Earth, caring for the soil which feeds us and from which almost all life flows. It means that we must

cease poisoning the environment. We must stop destroying parts of the land and turning it into desert and waste. We must recognise the important roles played by all animals and plants, on land and in the sea. Conservation is all about survival. Survival of the planet and its unique life system. By conserving the planet and its natural life, man is looking after his own future.



Pollution does not stay where it is created – winds and currents spread the danger everywhere.

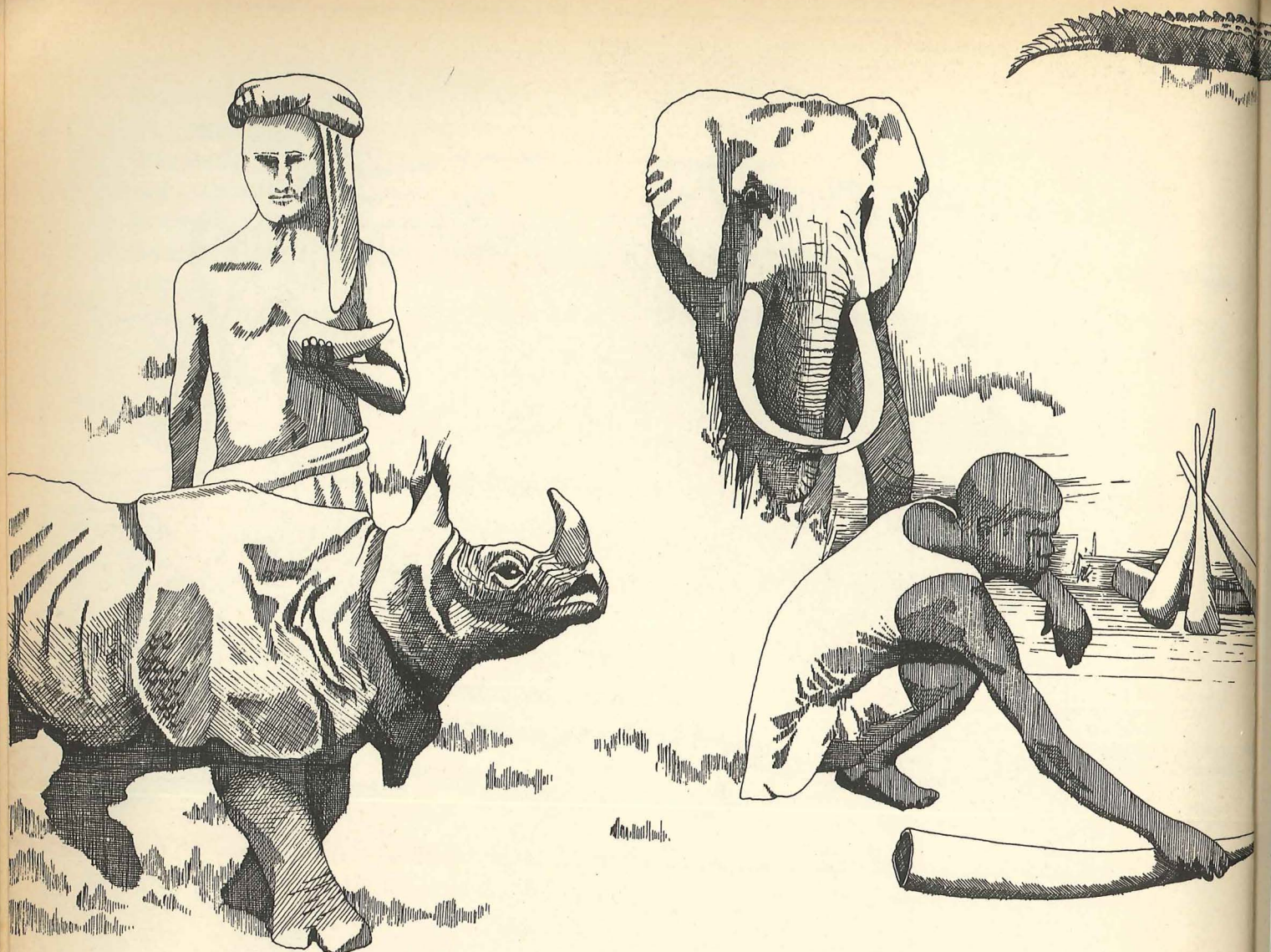
Earth – A Dying Planet

In the 1970s we can expect to see even more pollution being poured into the environment.

What is the result of pollution?

The end result will be total pollution of the planet and therefore loss of life, unless we act now. This dismal prospect is not as impossible as it may sound. Even if pollution of the land by industrial wastes and pesticides and of the air by smoke, gases and metal particles

is confined to certain small areas such as farmland and cities, this is no reason to feel optimistic. Unfortunately, pollution spreads to all areas. It is carried by winds and rivers, and once it reaches the sea the currents carry it to all parts of the oceans. No part of the world can escape and already almost the whole planet shows traces of pollution of all kinds. Man is completely and wholly responsible for this.



Man has mercilessly destroyed animals for his own vanity. If he does not stop many will become extinct.

While wrecking the planet man has also destroyed many plants and animals which were useful to him and had a right to their place on Earth. Hunting has added to the effects of pollution on wildlife and the interference with the planet has resulted in a general decline of wildlife. Man's ignorance and greed have made many animals extinct and now threaten even more. Rhinoceroses have disappeared, some almost completely, because man hunted them for their horns, which were thought to contain special medicinal properties. Although this has been proved untrue

rhinoceroses are still hunted. Elephants have suffered because their ivory tusks are highly prized. The horns of many animals are used as decorations. Birds were once slaughtered in huge numbers to provide ornaments and for use in fashionable ladies' clothes. Nowadays this practice has been outlawed in many countries, but crocodiles and alligators, along with snakes, are still killed in large numbers every year so that expensive handbags and shoes may be made from their skins. Animals of many species are slaughtered for their skins and furs to provide coats. All this is unnecessary and at last there are organisations to try to prevent the



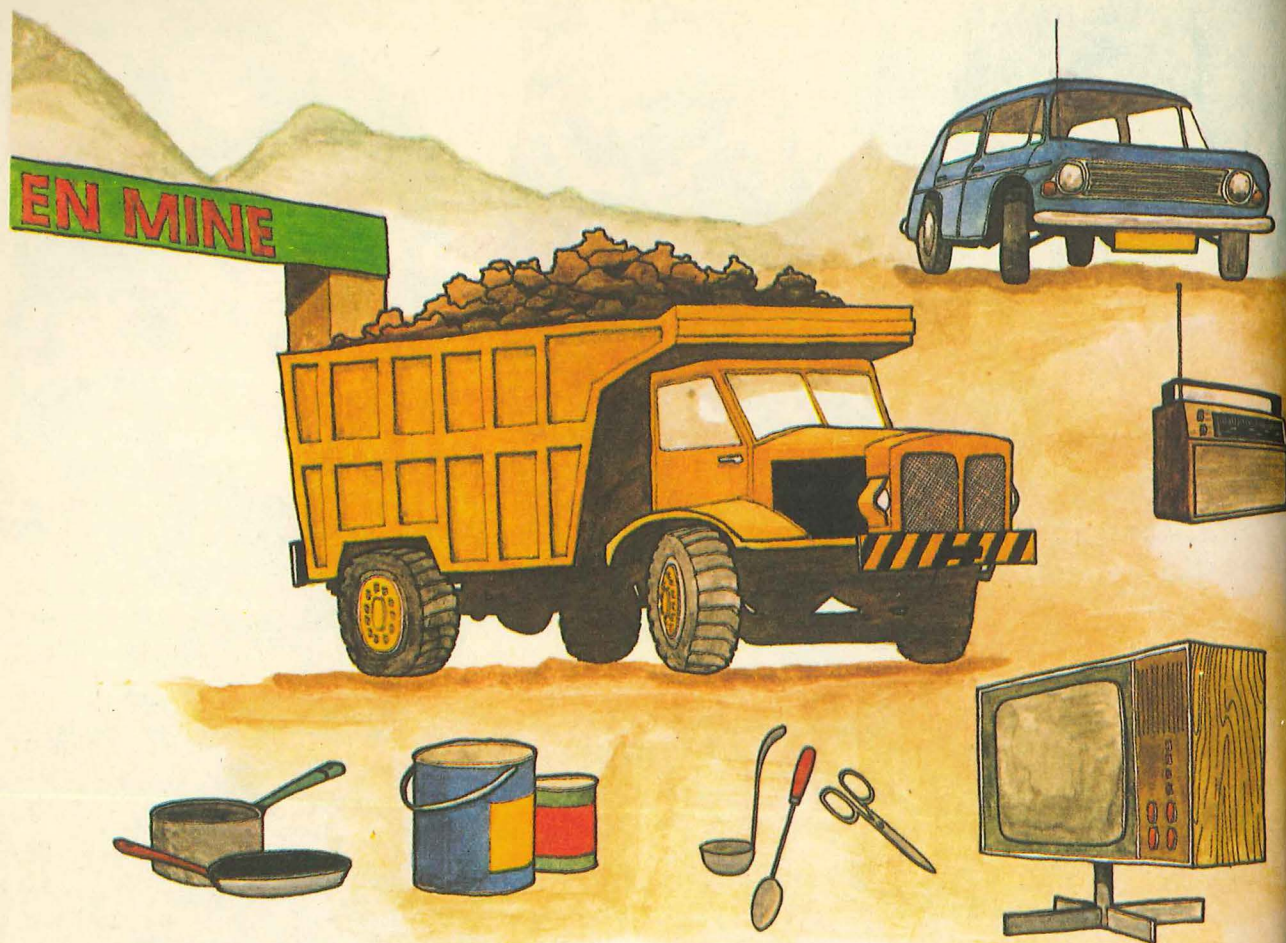
indiscriminate killing of so many of our wild creatures.

We must protect our wildlife—for two basic reasons. Animals and plants have a definite role to play in nature's plan and they are a source of beauty and great interest to many.

The combination of over-hunting through greed and pollution through ignorance has nothing but a harmful effect. It kills many thousands of animals each year. The effects of pollution on wildlife can show man what will eventually happen to him if he does not stop and

Is man's future secured?

consider what he is doing. All forms of pollution cause death to plants and animals first, have already killed humans in Japan, and contribute towards many illnesses such as bronchitis and cancer. As the planet dies through pollution and misuse so man will die. This can be seen by looking at the way in which animals die. If their habitat—the place in which they live, feed and breed—is poisoned or destroyed they die. If man poisons the whole planet then he will simply be poisoning himself. As he is already doing this the future of life on Earth looks grim unless some control is exercised.



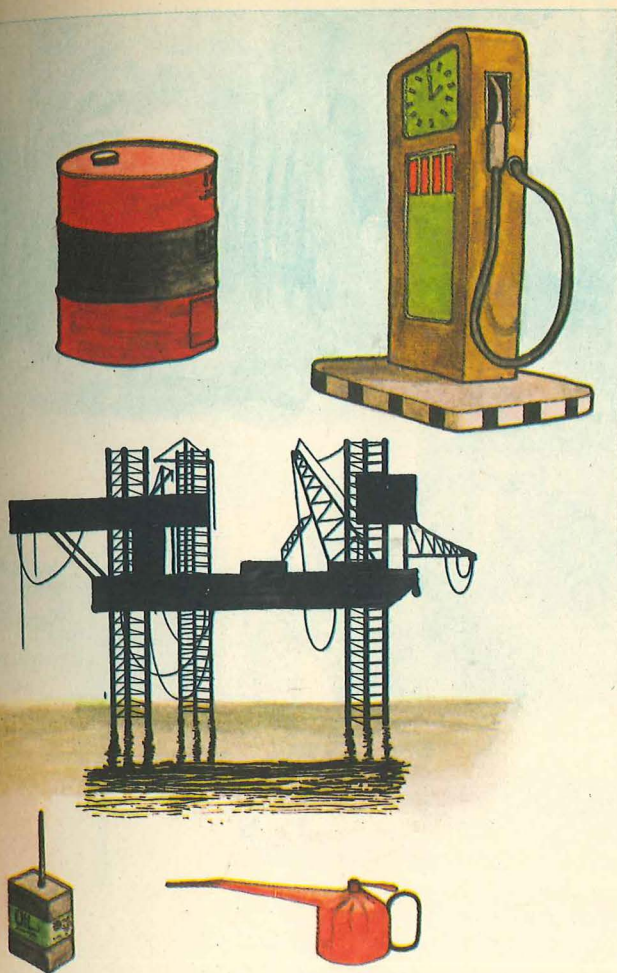
We take minerals and oil from the Earth to make the everyday things that surround us – can you see things about you made that way?

The Earth is very slowly dying through

Why is the Earth dying? man's bad and senseless treatment of it. He

has eliminated many species of plants and animals. His pollutants have brought about the situation in which the rivers and seas hold less life, the Earth itself holds less life and the soil is now capable of producing less food, yet good land is still taken for building. This is a worrying situation because the human population of the world is increasing rapidly and so more not less food is needed. At the same time as the

population increases the natural resources of the Earth are being used up at an ever-increasing rate to provide comforts for the people. We have always treated these resources as if they had no limit but now we suddenly realise that they will not go on for ever. We are using them all up far too quickly—all the minerals and metals which are mined all over the world for man to build and provide extra comforts for himself are running out. Man extracts fuels such as oil and coal in billions of tons and at enormous expense. All kinds of metals are mined in



order to build automobiles and other forms of transport and to make household goods, tools and other things. However, all these treasures which the Earth holds are not limitless—the Earth will not go on producing them for ever. They have taken millions of years to form and were not used, at least not on any noticeable scale, until relatively recently. Nowadays they are being rapidly used up, so much so that some may well have been completely exhausted by the year 2000. We take for granted and rely on oil, for example, and many of the products that come

from it. But oil may well be no longer available in 30 years' time if we continue to use it at the rate we are using it now—or, what is more likely, increase the rate greatly as the population of the world increases.

Perhaps the most obvious way in which

**How does man
destroy the planet?**

we are doing
harm is seen
when we look at

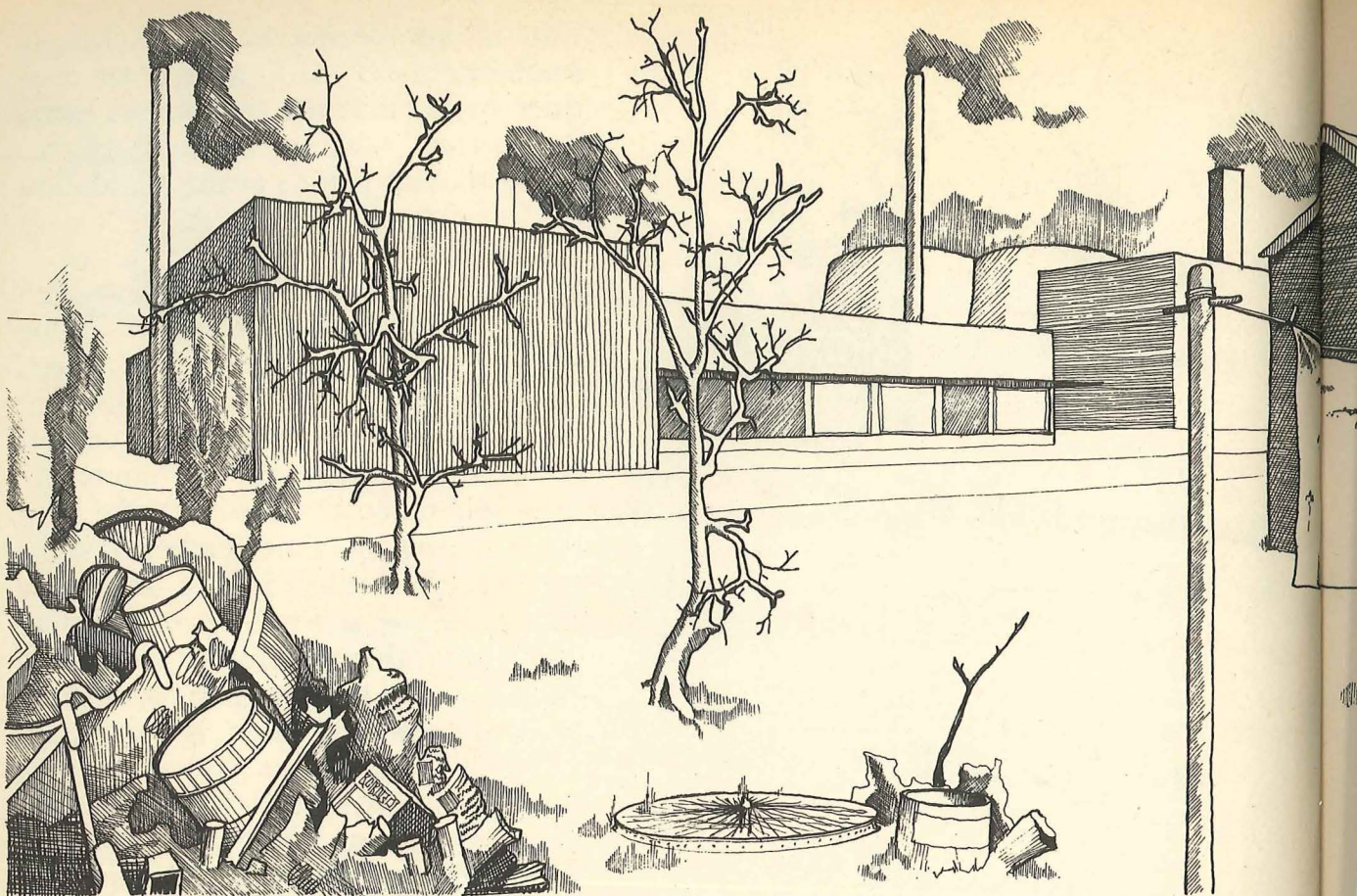
the land—at what was once natural countryside, forestland and coast. By removing trees we take away the protection which the Earth had against the weather. We also detract from the quality of the soil because plants and trees, when they die, return to the soil to feed it and keep it alive. What happens when the vegetation is removed is that the soil becomes poorer and the top layers of it, which are the most important, are eroded—blown away by wind and washed away by rain. We have cut down hedges which were the home of many kinds of wildlife to give more room to grow food and make it easier to spray the soil with pesticides. Yet hedgerows are man-made environments—they were planted by man when he divided up the land into sections for farming.

From all aspects the Earth seems to be dying. There is

**Can we halt the
trends?**

encouragement
in the fact that

we still have time, by acting quickly, to halt the progress towards final destruction. But we must first of all accept that much needs to be done and many attitudes have to be changed. We must also realise what we have done wrong and understand in what way it affects us. For example we must never forget that uncontrolled clearance of woodland has a disastrous effect on the balance of nature.



Smoke from factories, houses and bonfires creates aerial pollution over many miles of blue sky.

Pollution of the Air

Pollution of the air, as that of land and water, is the direct result of man's ignorance of the basic factors which make up a balanced world.

What causes air pollution?

Man pollutes the atmosphere in a number of ways and because many of the effects are not at first obvious air pollution is possibly one of the worst hazards. It is also becoming worse and worse as the population increases and as countries become more 'developed' and therefore more industrialised.

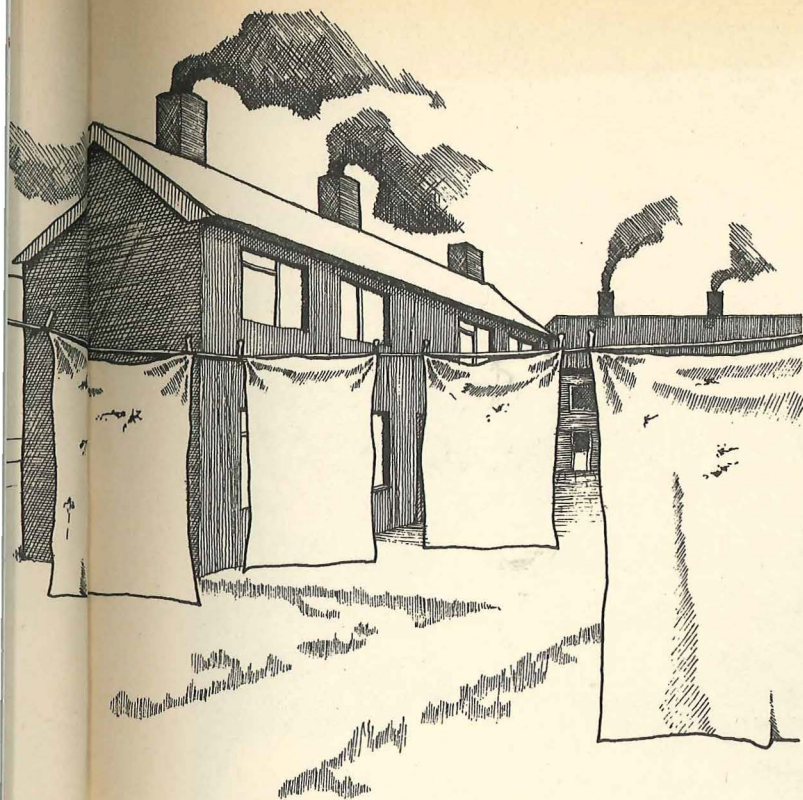
The main types of pollution of the air come from industrial smoke but pollution is also caused by burning of

refuse and agricultural waste and the use of open-hearth fires.

Jet aircraft do not directly cause pollution but they have the effect of producing more

Can aircraft affect the atmosphere?

cloud cover, thus affecting the climate, which in turn affects wildlife. The fuel used in modern jets contains hydrogen and this combines with the oxygen in the atmosphere to produce water vapour. This in its turn adds to cloud. The very large transporter aircraft fly at very great heights where man could not live without a special supply of oxygen to breathe. At such heights the



water vapour the planes produce tends to remain for longer periods of time. What effect this may finally have on the Earth's climate is not known. It may be minimal but it may also be disastrous. We cannot afford to take the chance of hoping that everything will be all right.

Industry is responsible for much pollution, of all kinds, and it does have a greater effect on the atmosphere than other factors. In northern England, parts of northern Europe and various other parts of the world, pollution from industry has reached very uncomfortable levels. Most industries produce as by-products poisonous gases and thick smoke, which is all passed through chimneys into the atmosphere. In many places it

Does industry cause pollution?

does not escape very quickly and is added to each day. In regions where there are many factories the air becomes grey with smoke and gases. Plant and animal life ceases and man's health suffers. Smog is caused by a polluted atmosphere when fog is mixed with smoke and this particularly unpleasant situation increases breathing troubles in people, particularly old people or those with weak lungs. Smog used to be common in London but has now disappeared since the introduction of laws banning the release of smoke into the atmosphere. Bronchitis kills thousands of people every year and almost all those who die have lived for a long time in areas of heavy industry and air pollution. Many die as a direct result of polluted air but many others suffer for years with chronic illnesses from the same source.

The motor car is one of the worst offenders of all. **Do cars cause pollution?** The fumes from car exhausts not

only contain carbon monoxide, a highly poisonous gas in large quantities, but nowadays they hold a more dangerous substance, harmful to all forms of wildlife and man. Lead is combined with the petrol in order to give better engine-performance and to enable cars to accelerate faster. Unfortunately, but predictably, minute lead particles are present in the exhaust and are swirled about in the wind or settle as dust on the ground. Lead is extremely dangerous and attacks the brain, causing various diseases which are sometimes permanent. At present there is not enough lead pollution of the air to cause too much trouble to human life but the level is increasing steadily and in combination with other poisonous particles and gases which find their way into the atmosphere there is every



Exhaust fumes from cars and lorries add poison to the atmosphere. In some parts of the world, like Japan, it is so difficult to breathe that there are oxygen machines at the street corners.

likelihood that the situation will before long reach danger point.

There are particular centres in the

What effects do car exhaust fumes have?

world where the number of cars and other traffic on the roads is far too high and this produces a strange kind of pollution called photo-chemical smog. This is caused by strong sunlight acting on exhaust fumes and producing a poisonous haze. In Los Angeles in the United States this has for some years been a problem and as the population increases and also becomes more wealthy the situation can only worsen. Trees many miles away from the built-up areas have been killed and the bristle-

cone pines, the oldest living things on Earth, are also poisoned. Similar problems exist in New York, and in Tokyo the problem has reached such proportions that special oxygen-producing machines have had to be set up at regular intervals in the worst affected streets. When the atmosphere in these streets becomes too polluted, people have to rush to the machines to inhale oxygen—just to keep alive. Until the volume of traffic is reduced things will not get better. In London this particular problem is not too bad. There is not quite so much traffic and not so much strong sunlight, although in summer there are occasional exhaust smogs in the centre of the city.

In most of the world's cities there is a hazard of pollution from power stations. With

How do power stations pollute?

cities growing larger the need for power stations to provide electricity increases. More and larger power stations means more pollution. Gases and thick smoke pour out into the atmosphere, causing smog and increased cloud cover. This limits the amount of life that can survive and is a risk to human health.

The whole modern trend towards urbanisation poses numerous problems. Already overcrowded cities are pushed to their limits and have to provide more and more amenities, need larger factories and power sources and find that there are

Is overcrowding in cities dangerous?

infinite problems with refuse disposal. The air becomes less and less clean as cities expand to accommodate people. In the United States seven out of ten people now live in towns and cities but all of these towns put together make up only two per cent of the land surface of that country. So nearly three quarters of the population occupy two per cent of the land. The people are still moving from the country to the towns and by the year 2000 AD about 90 per cent of Americans will live in cities. The population of the United States is now just over 200,000,000. The strain on cities is bad enough at present—what will it be like in 10 or 15 years' time? And the pollution of the air can only give us the greatest cause for alarm as more and larger factories and power plants are built to supply the cities.



The more people there are in the cities, the more factories there need to be to supply them with goods; and the more factories there are, the more aerial pollution there will be.

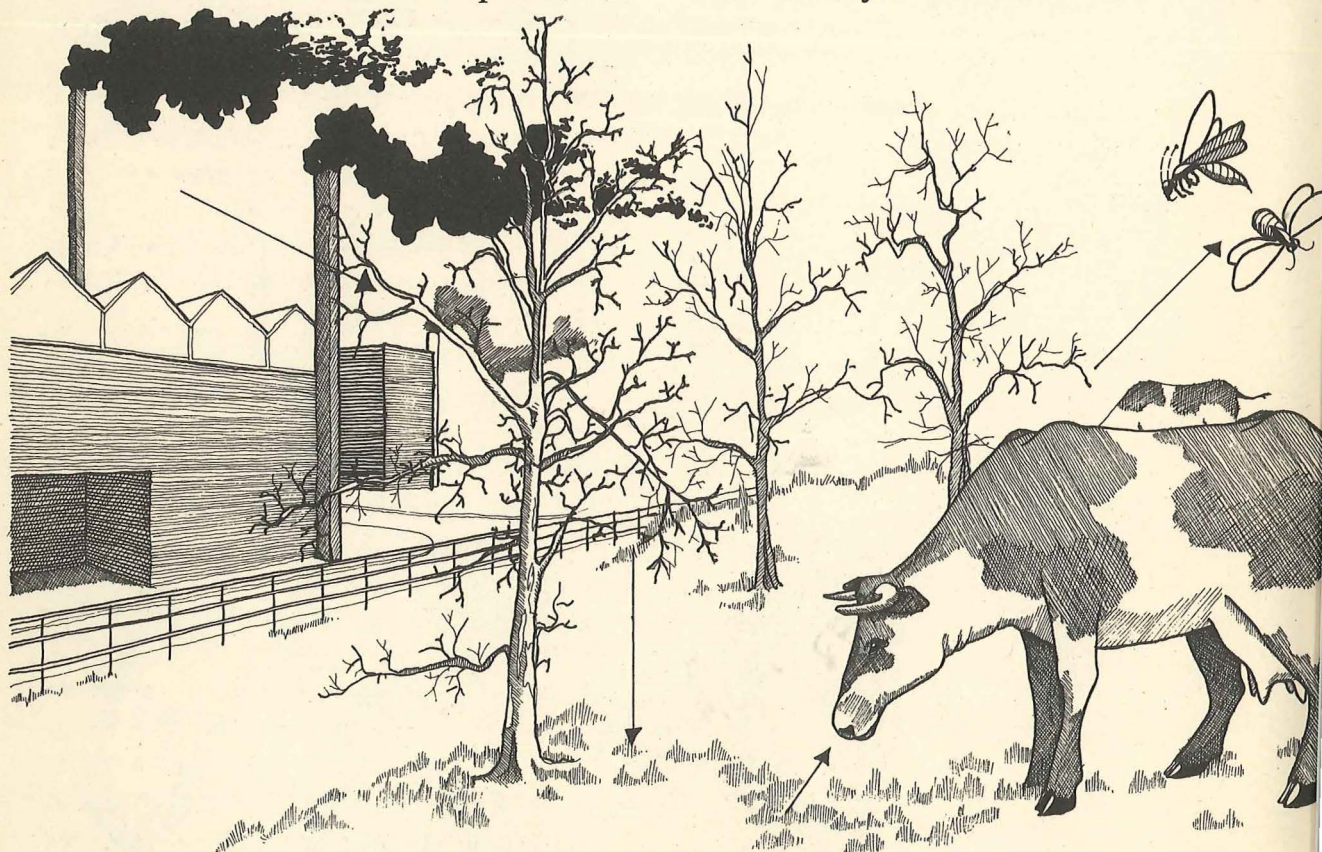
Pollution of the air can often cause pollution of the land. In highly polluted areas

Can air pollution affect land and sea?

the air contains all sorts of harmful particles of dust and gases that will dissolve in water. When it rains or snows these are caught up by the rain as it falls and soak into the land to add to the pollution already there. It also falls in lakes and reservoirs and over seas and oceans. Any housewife will have noticed how dirty her washing becomes if she accidentally leaves it hanging on the line when it rains. The dirt is caused by smut in what should be pure rainwater.

The effects of polluted air on man have been mentioned
Does wildlife suffer? —the harm done to lungs and the breathing diseases which follow. Wildlife and plants are

also seriously affected. Plants are stifled by impure air and soon die through lack of nourishment. At Bedford, England, dust and fumes from a brick factory spread over the countryside and turned healthy trees into grey lifeless ones. The grass underneath the trees was not killed and cows continue to graze. But what sort of milk must they be producing? Insects which rely on plantlife cannot survive, and flying insects cannot live in the polluted air of cities. There are quite a number of insect-eating birds which catch their food on the wing. The best known are the swifts and swallows. Long studies have been made on the House Martin, a small black and white swallow-like bird which feeds on small insects fairly high in the air. Over eighty years ago these birds bred in London regularly but disappeared as the air pollution over the city exterminated their food—



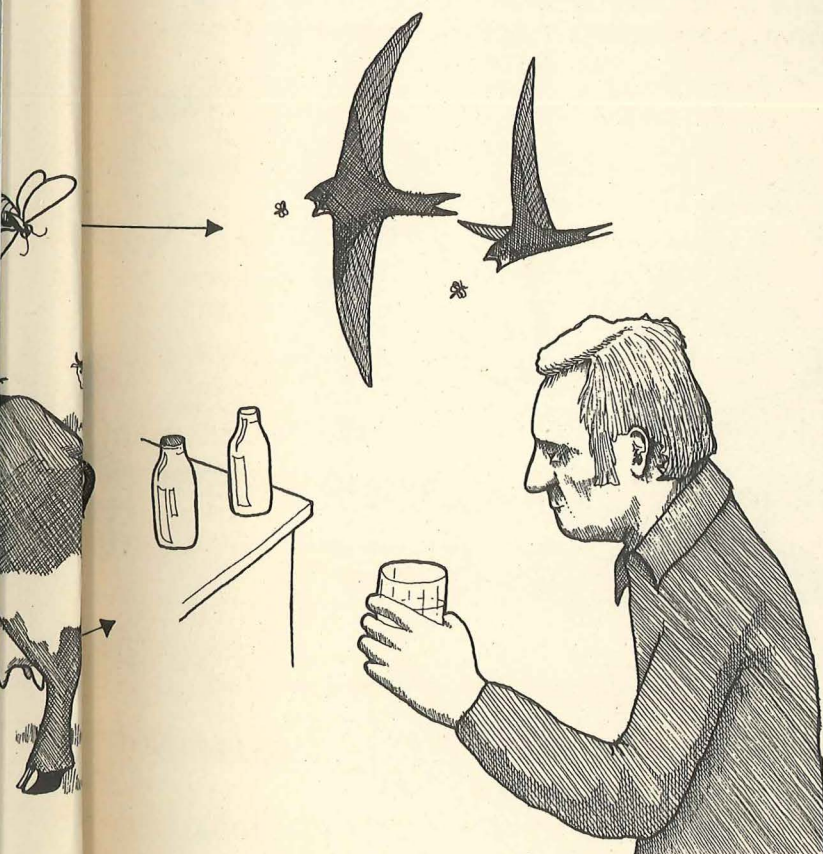
Factory smoke belching from chimneys can cause at least two pollution cycles.

1— The smoke kills the trees; cows eat the grass beneath the trees; we drink the milk produced by the cows. 2— The smoke kills the trees; insects eat some of the plants beneath the trees; a bird eats the insects.

the flying insects. In 1954 laws were passed and restrictions introduced to limit the amount of smoke and other pollutants which could be released into the atmosphere. Smokeless zones were created where the burning of refuse, fuel and factory wastes—indeed the release of any wastes into the air—was forbidden. In the 1960s the House Martins returned to breed in central London because the insects had returned with the cleaner air. Swifts, too, have increased in numbers as a result of cleaner air and other birds which feed on insects at ground level also show signs of better fortune.

Of especial interest are lichens (pronounced 'likens') and the areas where they are found. Lichens are small plants which grow often where there are no other

Can plants show us pollution?



plants—on rocks, tree trunks and bare soil. They are slow-growing but live for a long time. Lichens enjoy the sun and flourish wherever the air is unpolluted. In Great Britain these plants, which are particularly sensitive to air pollution, are found mostly in the west. They used to be found throughout the country but have gradually disappeared over the years. In the south-west not only is air pollution less but what pollution there is is blown away from the area by the winds. The presence or absence of lichens can, therefore, indicate the degree of air pollution. Are there lichens where you live?

Again, in Scandinavia, certain mosses seem to be good indicators of lead pollution in the air. The amounts of lead in mosses have been known since the middle of the last century. They have steadily increased all the time, showing sharp rises at the time when the industrial revolution really got under way and even more so with the advent of the motor car. In Greenland levels of lead in the snow have shown a similar rise since the middle of the eighteenth century. Here too rises have been recorded at about the same time as they were in Scandinavia. There are almost no cars or factories in Greenland yet pollution still reaches this northern country, most of which lies within the Arctic Circle. The problem here is one which affects the land and sea—it is the spread of pollution from a small source to many other areas.

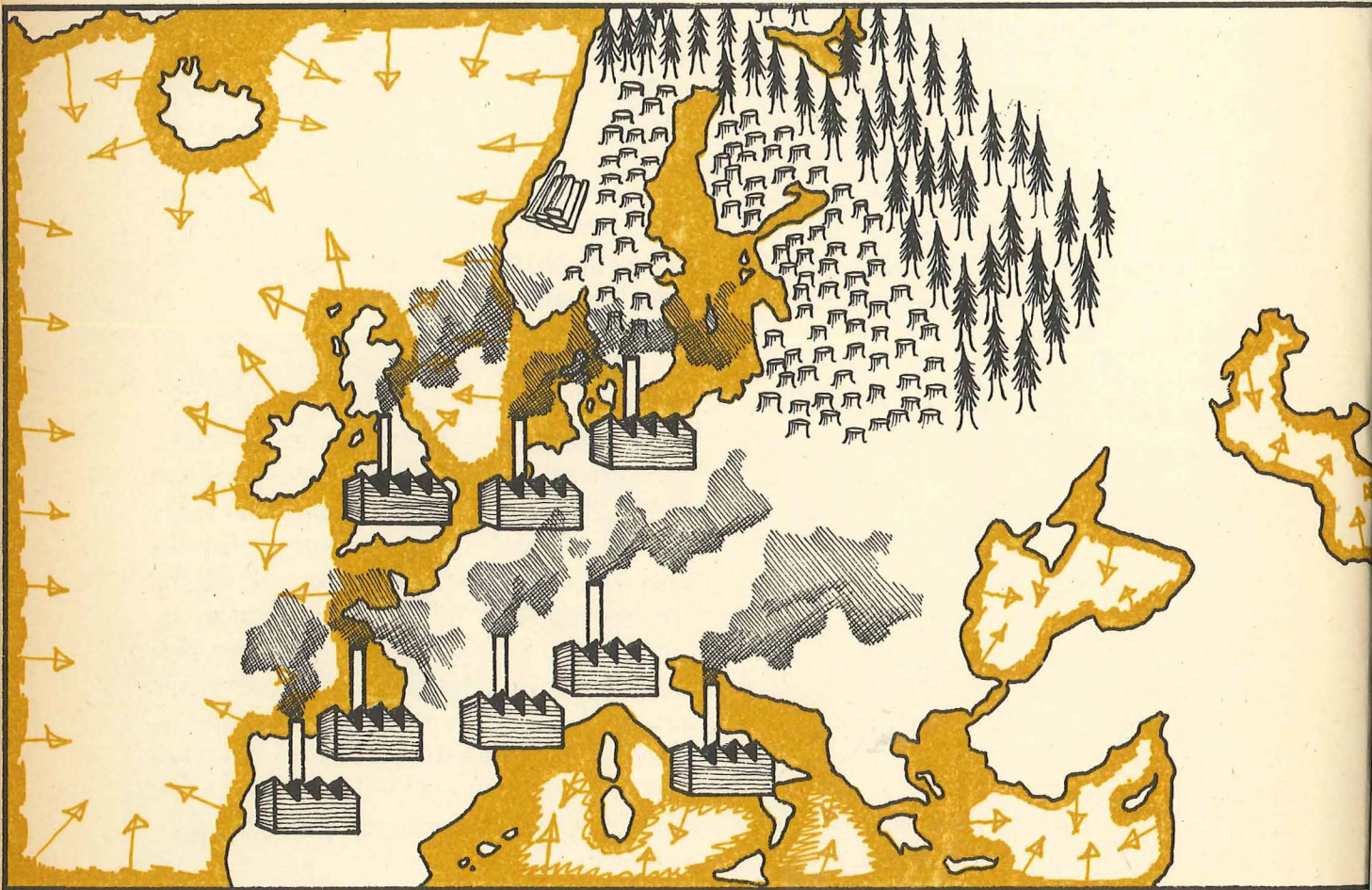
Air pollution, like that of the pollution of land and sea, is carried by the wind to other areas. Lead particles caused by car exhaust fumes and wastes from factory chimneys are carried on the wind to regions far removed from their source.

Does wind spread pollution?

Much of the harmful gases which are emitted by factories in Germany and Great Britain find their way eastwards. They are carried to places such as Scandinavia and north-east Russia by the prevailing westerly winds. In Sweden, particular winds from the west carrying sulphur dioxide from factories in western Europe have caused extensive damage to the forests of that country. Much of Scandinavia

is covered by large conifer forests, which act as a natural refuge for wildlife and as a protection against very cold weather, as well as a source of timber. If the sulphur dioxide poisoning from other countries eventually destroys these forests the result would be a complete change in the natural life of the regions affected—and this includes an effect on man himself.

Over Europe winds usually blow from the west carrying smoke and pollution from industrial centres to Scandinavia and elsewhere.



Man relies on wildlife and natural resources more than he realises. **Does man need wildlife?** Wildlife provides food and also keeps in check many things harmful to man—poisonous insects and plants and life forms

which might overrun the planet if not controlled. Timber provides building materials, paper and heating. If air pollution assists in destroying these then it can only have serious long-term effects on man's life on Earth.

The fall-out of radioactive products, mainly the result of exploding nuclear bombs in tests, has in the past been a question which caused many arguments. Nowadays, with so many other types of pollutants, it has been forgotten. Strontium 90 produced by nuclear explosions can be found almost everywhere on our planet and with atomic tests still continuing levels of pollution from this source are increasing. It falls on grazing land (as well as everywhere else) and is consumed by cattle and sheep. This automatically affects milk and enters man's body when he drinks it. Damage and disease to bones has

**What about
radioactivity?**

yet to be fully realised but it is known that too much of this pollutant does affect bone marrow and can cause death.

The problem of air pollution is a large one. We live because we breathe air, but the air must be natural clean air with sufficient oxygen. Air is crucial to all forms of life on Earth, and we have to make sure that we do not pollute it and make it unsuitable as a life-sustaining force. If we are not wise we may one day have oxygen machines on every street corner in every town and village in the world.

**Why is air so
necessary?**

Pollution of the Land

All of us throughout the world are dependent to some extent at least on the land.

**How much do we
need the land?**

Even those of us who never see the countryside and think we can do without it are using its resources and produce daily. Man relies on the land in every part of the world for food and, with populations expanding each year, man has to get more and more from the land in order to feed an ever-increasing number of people. Today we have to use fertilisers to try to improve the amount and quality of produce grown in the soil. Chemicals are used to kill pests and weeds in a desperate effort to increase output. Many of these actions appear to do this but in reality they often do more harm than good since they alter the natural balance between living things which has been established over many thousands

of years. When man employs intensive methods in his attempts to produce more food he takes away from the land more minerals than he can ever give back and causes the eventual breakdown of the very soil on which he depends. Instead of being able to grow more he reaches the state where he can grow nothing. Although his intentions at the start are good, in as much as he wished to provide enough for his fellows, he finishes by creating even bigger problems than he had when he started.

Sometimes the effects of our actions can be only too obvious. When soil is over-used it ceases to produce life and turns to dust. The same thing happens when large areas of forest are cleared. In the soil there are millions of minute living

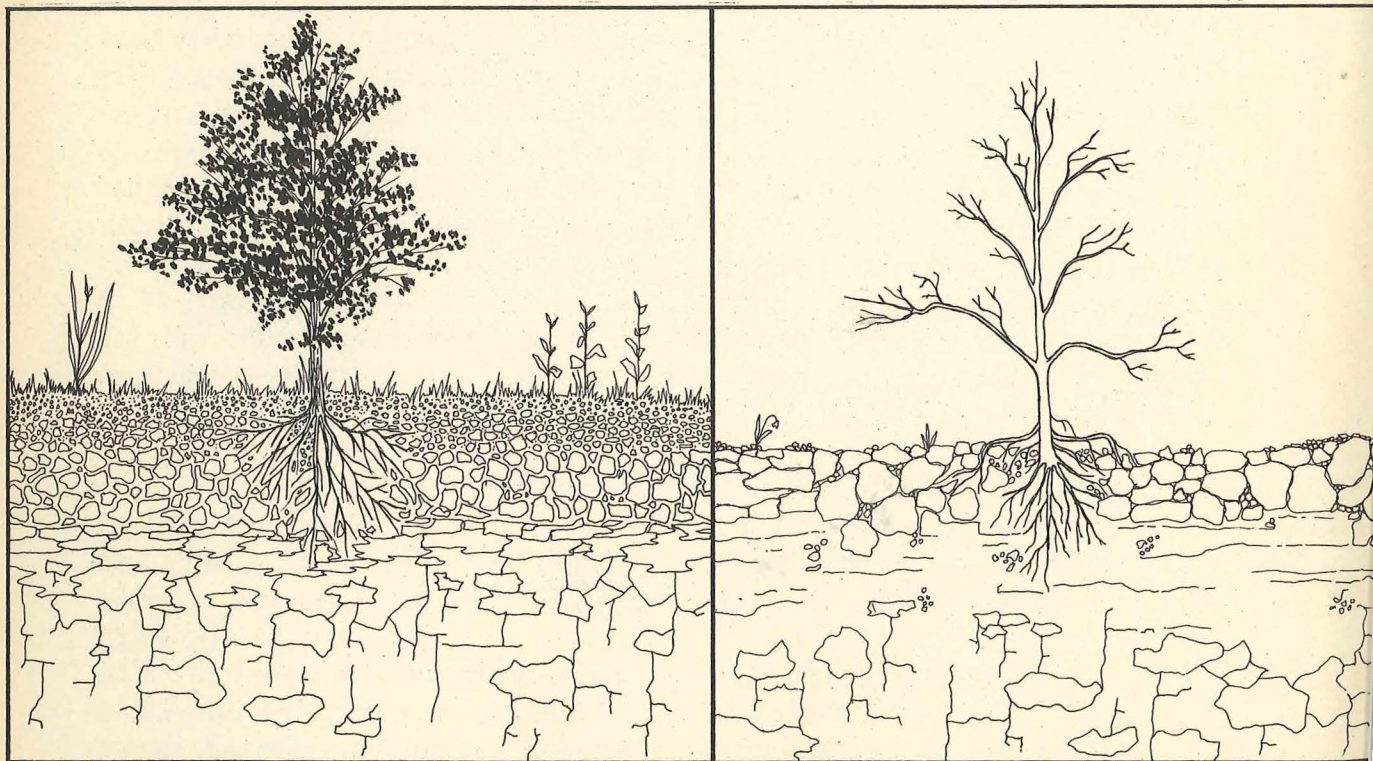
**How does the soil
work?**

can be only too
obvious. When
soil is over-used

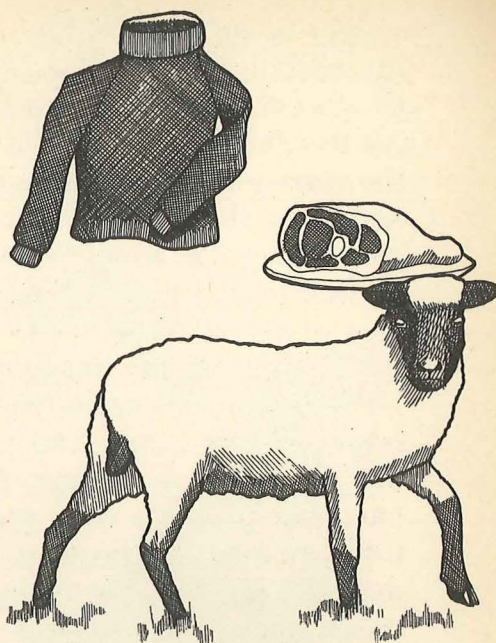
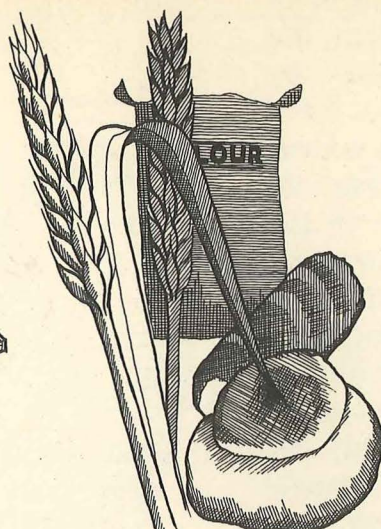
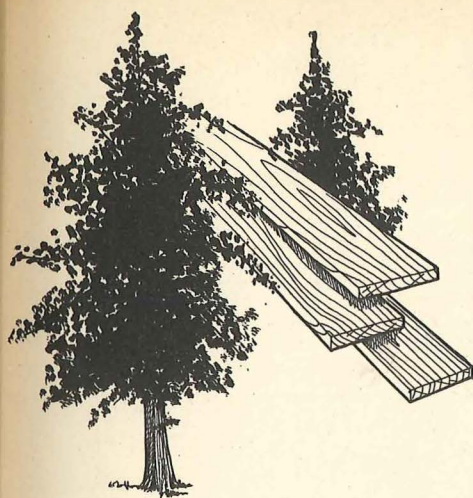
organisms on which all other forms of land life ultimately depend. Without these there could be no worms, no trees or bushes, no insects or birds—no man. All these living things depend on each other for their existence. The smallest living things in the soil depend on roots of trees or plants in order to continue to live and the vegetation itself depends on these small organisms. When leaves fall from the trees or plants die they return to the soil and replace what the roots have taken out. This ensures that the whole system of life carries on. However, if this process of life is interfered with, or if the life above the soil is removed completely, the soil may die and become a desert. The same thing happens if the life under the soil is destroyed by chemicals or by over-use of the top layer. In short, if we look after the soil and respect it it remains fertile and usable but if we misuse and maltreat it it dies. There are many examples throughout the world of man's ignorance in this field.

In the middle of the United States an enormous dust-bowl has been created which is barren. This was once an area of woods and meadows but man cleared the woodland to provide grazing for cattle. This altered the vegetation and limited the variety of what would grow. The acidity of the soil increased and this drove out the earthworms and the natural nutrients—natural life-forms which feed the soil. Finally the area became a desert where natural foods near the surface are just blown away. The area is liable to long periods of drought which harden the surface and dry out the soil. This means that plants cannot take root. Irrigation of the land is of no use as the poor soil becomes no more than a sea of mud which becomes hard again in the sun. This desert has been created directly by man and by no other living thing. In Spain man has created similar problems and in northern England he has created

How is a dust-bowl created?



In an area that was once woodlands and meadows, the interference of man has created a huge dust-bowl.



Everything we use is originally extracted or grown from the soil.

infertile moorland by destroying the original forest for grazing and turning thousands of acres into nothing but coarse grass and heather.

Forestland has also been cleared in England in East Anglia. This had the effect of removing the

natural barrier which stopped the strong winds from the North Sea blowing over the land. This altered the climate and the animal and plant life which existed there. It also altered the nature of the soil and upset the overall natural balance of the area. No chemicals or unnatural fertilisers were used in these areas. Man just interfered by taking away what nature had put there in the first place. By doing this he used up the land and limited what use it could be to him.

All life on land depends on the soil and that includes man. Man needs it to grow food, to grow wood to build with and as fuel, and for growing

special vegetation for feeding his animals. He needs what the soil produces and the soil needs what it has naturally and what is put back into it if it is to survive.

This does not mean that man must necessarily leave the land to itself altogether. What he must do is manage it carefully and wisely. If land has to be farmed it must be done properly and what man takes out of the soil he must put back in some way. If natural wastes are returned to the soil this is often sufficient. If not then artificial substitutes must be carefully chosen and controlled.

It is often stated nowadays that man can grow plants without soil. This is true but we do not know

the long-term effects of the artificial fertilisers which are used. And if we did use this method of producing food the Earth might be misused or allowed to deteriorate—this would cause the breakdown of almost all other forms of life. This would mean at the same time that we should not have the natural

supply of oxygen and the taking in of the carbon dioxide wastes which life produces—processes performed by plants and trees. We should not have the variety of forms of life, both animal and plant, that we now have. We should be altering the whole structure of the surface of the planet and we have no idea of the effect that this would have on man but we can imagine some quite horrific results, especially if the human population is larger and the attitudes of man do not change. Already we have the problem of a great increase in the number of people suffering from mental illnesses in large built-up areas. How much worse would this be if we made our planet a complete concrete jungle? Surely we must preserve our land and its soil to avoid creating even more problems which we cannot solve and which would probably destroy us in a very short time.

Chemical pesticides and weedkillers are widely used nowadays but their effect on the environment and wildlife is often disastrous. Many of the substances used are persistent—that is once applied they do not disappear after having done their job of killing pests but remain in the soil and are passed on to other forms of life. In this way the spraying of crops with persistent chemicals often causes the death of birds, mammals and reptiles, many of which are very useful to man in keeping down the numbers of harmful insects and rodents. So again man, by his interference and short-sightedness, creates more problems than he originally had. If he tries to correct his mistakes by using the same methods which caused them the result can only be total destruction.

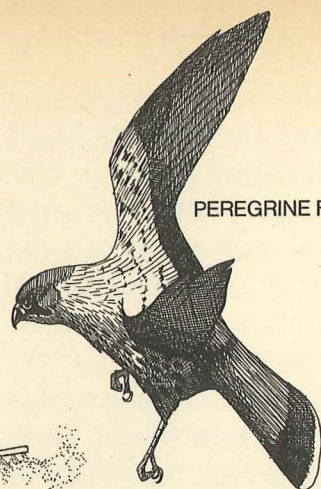
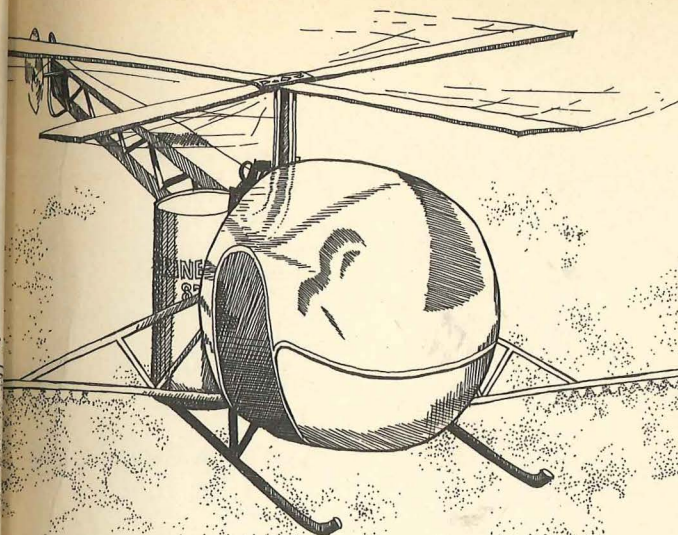
Are pesticides beneficial?

widely used nowadays but their effect on the environment and wildlife is often disastrous.

AMERICAN KESTREL



A fairly recent example comes from North America. A relatively small area of farmland was sprayed with chemicals in order to kill a fungus which was abundant. A solution containing mercury was used. Shortly afterwards it was found that all the American Robins in the area had died. Thousands were found lying dead and post-mortem examination revealed that they had died from mercury poisoning. American Robins are the farmer's friend as they destroy millions of harmful insects, earthworms and slugs. When man uses highly poisonous substances to kill pests he invariably kills other forms of life as well. The poison is passed on from insects to the animals which prey on them, and then to larger animals preying on the smaller—and so on to man eventually. This passing-on of poisons causes the poison to be



PEREGRINE FALCON



AMERICAN ROBIN

We spray crops to eliminate pests and accidentally kill off the natural pest controllers like birds.

concentrated more and more until it is present at the end in lethal quantities. What might be the final effect on man himself, who is the top of the ladder?

Even if chemicals do not kill animals they often halt breeding. Small quantities of persistent pesticides can cause infertility in birds so that their eggs do not hatch. It has been found that the poisons have been passed on into the eggs. They also cause the shells of eggs to be very thin so that parent birds break the eggs when they incubate them. In North America two pesticides, DDT and Dieldrin, were found to have this effect on the American Kestrel, a bird which destroys many harmful rodents every year. The same has happened in that continent and in Western Europe to the Peregrine Falcon, which has become extinct in parts of America, and that

Can pesticides affect breeding?

country's national emblem, the Bald Eagle, has also suffered an enormous reduction in numbers as a direct result of the use of pesticides.

Nowadays there are restrictions on the use of chemicals in agriculture in some countries but this in itself is not enough. Huge quantities are still used in many countries, especially in the tropics and in 'under-developed' countries. Spraying of crops, particularly from the air, does not mean that the chemicals stay only in the area in which they were used. Much of the spray is carried on the wind to other areas where it settles.

Defoliants—chemical sprays to kill the foliage on trees and bushes—are now used in some parts of the world. These have disastrous effects on the environment and usually render the

What are the results of the use of defoliants?

landscape quite barren and totally useless as farmland, as well as destroying all the wildlife for hundreds of miles around. Although politicians might say that this is necessary in certain circumstances, the irreversible effect on the environment is more important. In future our descendants may well look back on what we have done and find it impossible to understand how we could really have believed that we were not harming our planet.

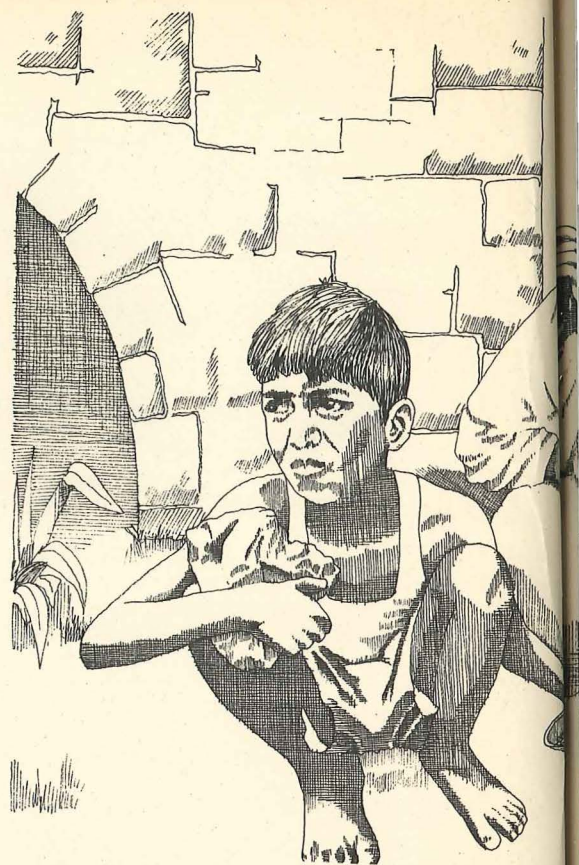
Many of the chemicals used on the land have been artificially created in laboratories. Chlorinated hydrocarbons—substances derived from carbon—have been used widely in recent years, usually with very undesirable and often lethal results. These are in many cases highly poisonous and yet are still poured over the land!

If we look carefully at the use of pesti-

Can animals resist pesticides?

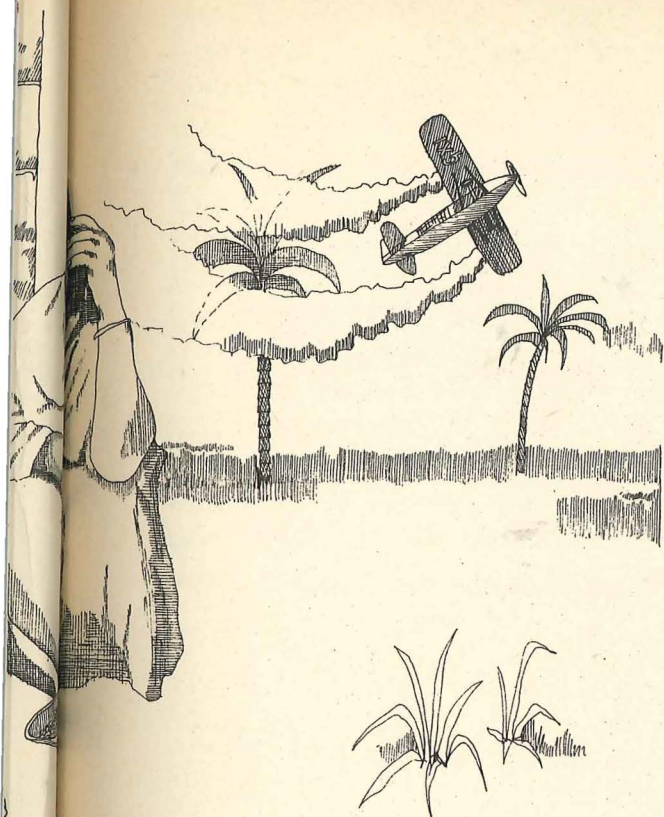
cides we can see that they have far greater effects

on our environment than might at first appear. In certain areas of the world pesticides have been used over a period of years in an effort to control malaria—a disease which is most unpleasant and not uncommon, particularly in the tropics. A good example of man's short-sightedness and ignorance comes from Central America where there has long been a problem of malaria among the inhabitants. During the 1950s the governments concerned started a campaign to rid the area of the disease. They decided that the way to do it was to spray insecticides over the whole of the region where the disease was found. First of all Dieldrin was used but in a short time the insects carrying the virus had developed resistance to this. DDT was then used in enormous quantities but gradually a resistance to this was built up. Then another pesticide was



Man eats the crops that have been sprayed with insecticides and ferti

used. At the start of the campaign there was a noticeable decrease in the occurrence of malaria but by 1971 the situation was back where it started. Malaria is now just as common and just as rife as it was in the 1950s. But that is not all. The environment itself has deteriorated alarmingly. Not only has the use of pesticides failed to lower the frequency of malaria, it has contaminated the region itself. Apart from the obvious destruction to wildlife, it has been found in large concentrations in foods, both animal and vegetable. The levels of contamination by DDT are higher than anywhere else in the western world, and in Guatemala—one of the countries affected—is present in its highest level in white corn, which is the staple diet of the people of that country. It is present in human milk and is therefore passed on to young babies.



The presence in the human body of even small quantities of DDT can have most harmful effects, and in larger quantities it may be fatal. DDT reduces our resistance to certain diseases and can cause serious nervous disorders. It has been shown in Central America that the long-term use of pesticides does not relieve problems but creates bigger ones, yet the same pesticides are still being used in many other countries in large quantities and over long periods of time.

One example of pollution of the land is obvious to all of us. This is the problem of refuse and what to do with it. In towns with large populations and especially in cities with populations numbering millions refuse disposal is a problem

which becomes more acute every year. Much refuse in our modern technological age is not easily disposable and is dumped. Great mounds of rubbish are formed and these are unattractive to the eye as well as being a source of infection, harbouring all sorts of bacteria harmful to man's health. Birds and mammals often gather at these dumps to feed on the scraps that can be found. When the birds fly off they may easily carry with them germs and bacteria and so spread the source of infection to new areas. Slag heaps too are an eyesore and can be dangerous if not properly looked after. In Wales a huge mound near a coal mine at Aberfan collapsed in an avalanche onto a school building, killing many of the children inside at the time.

There is a way of disposing of some refuse and waste in a useful way.

How could we dispose of refuse?

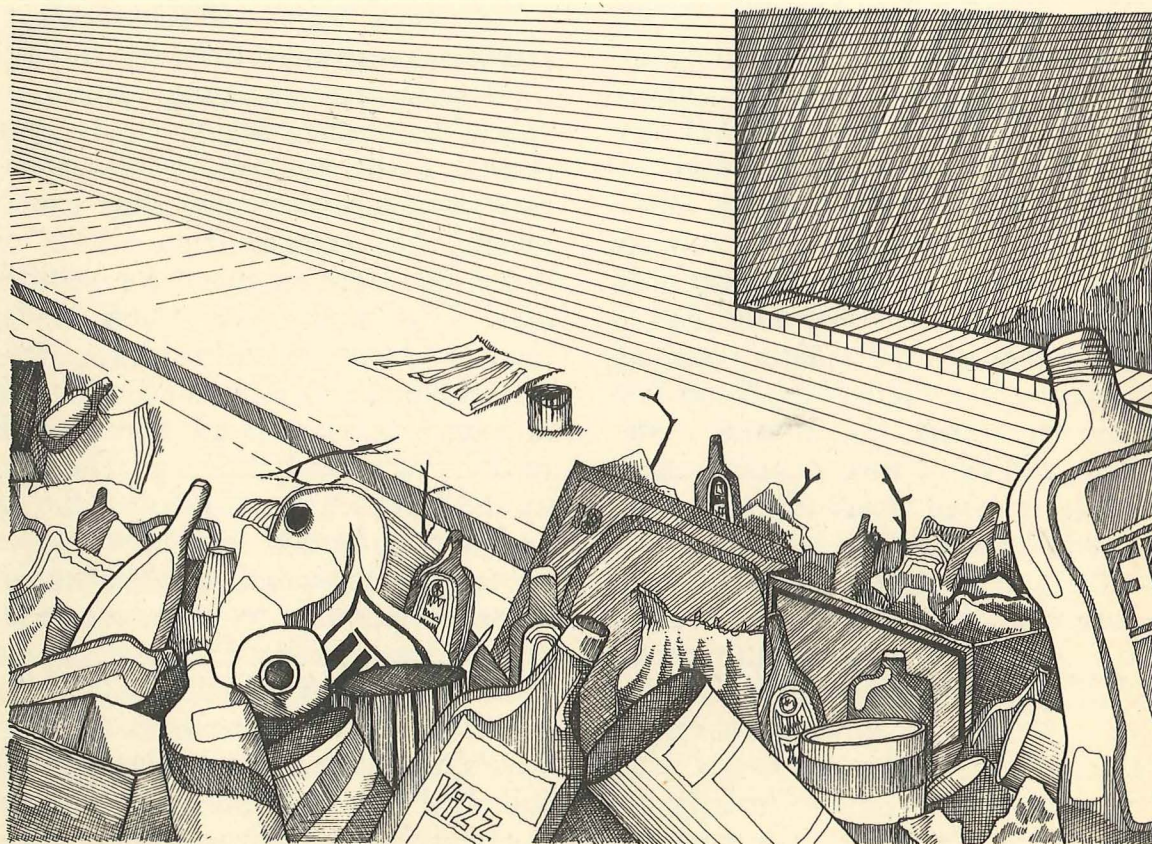
If some types of refuse are separated from the rest (the right parts are the living animal and vegetable matter, which has already started to decompose by the time it reaches the rubbish tip) they can be mixed with sewage from which the water has been removed for purification. This mixture can then be fermented (decomposed by heat to form new compounds). This is what happens in a compost heap in a garden and the result is very much the same. This compound can then be returned to the soil as it would have been if man had not become so organised in large built-up areas. It amounts to returning to the soil at least some of that which has been taken out. And this method causes no pollution at all—but the very opposite in conserving the quality of the soil. If the waste is burnt, as it is now in many places, it causes air pollution—but it can be used to produce power

without releasing harmful gases. This has been done successfully in a number of places. Why not everywhere?

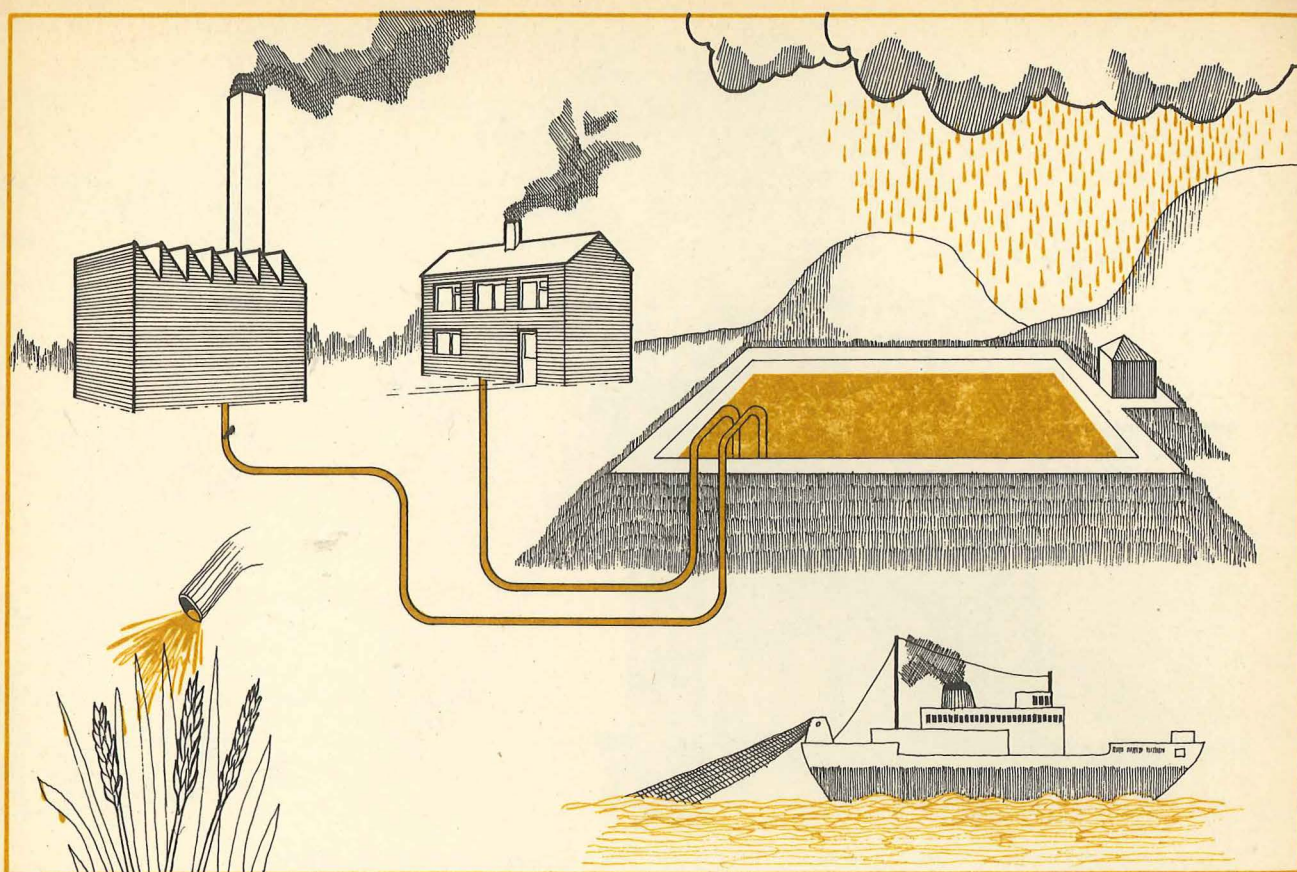
In recent years there has been a great increase in the number of containers and packing materials used, especially where food is concerned. Many pre-packed items are used daily by millions of people, but what is done with the packaging? Much of it must be dumped or burned. Many of the materials used, however, do not break down and are left to clutter up the Earth in ever-increasing quantities, and some of the

Should we reject pre-packed foods?

plastics which are burned release poisonous fumes into the atmosphere. Until a practical answer to this problem is given we should be better to do without the convenience of pre-packed foods. Unfortunately, though, the opposite is now happening since packaged items are so convenient. Non-returnable bottles are very popular because they can just be thrown away, but this only produces more rubbish and bigger rubbish dumps. Much of the material is virtually indestructible and will accumulate until a better means of disposal can be found—so turning the Earth into a vast rubbish dump.



New plastic containers are almost indestructible – how shall we get rid of them?



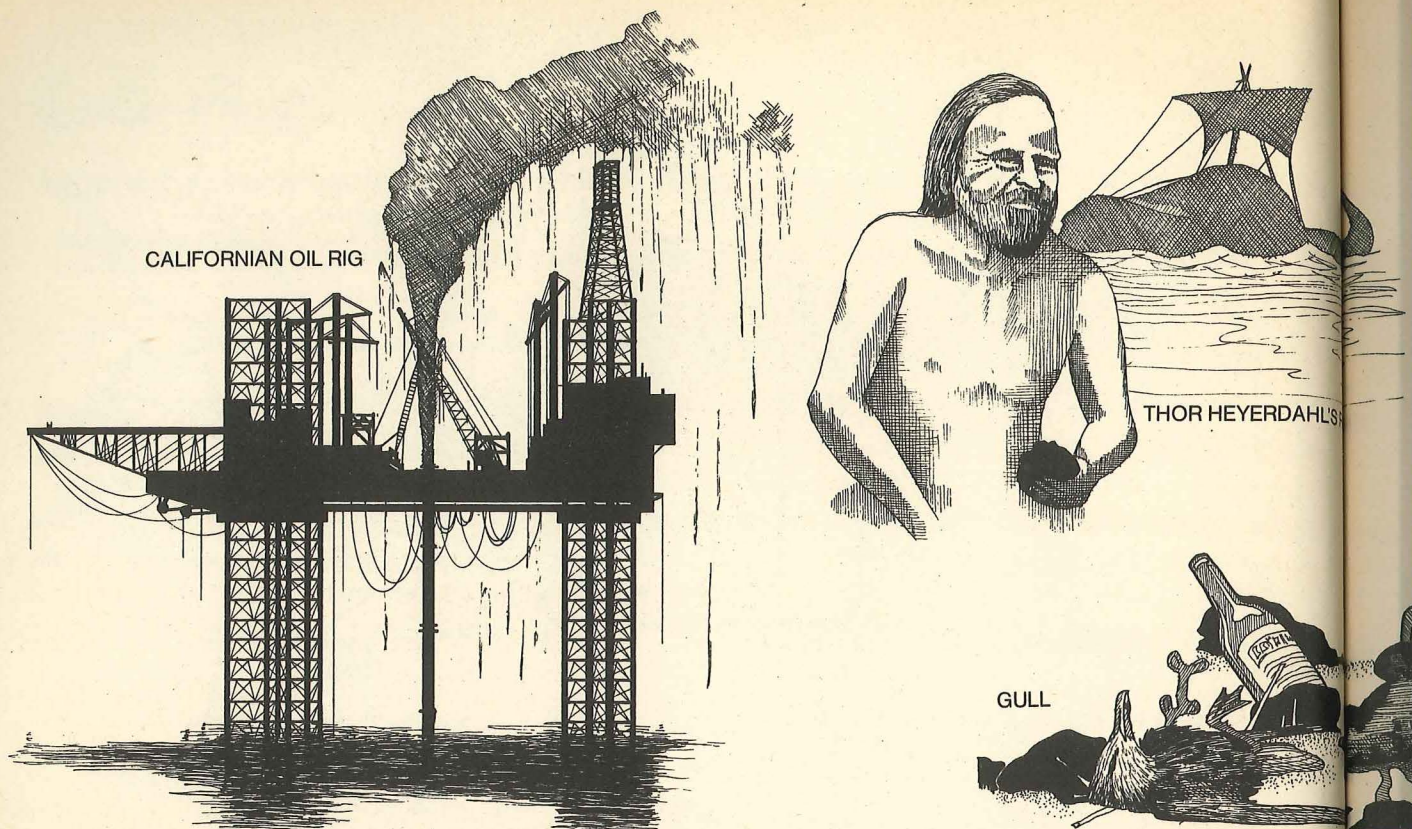
How could we exist without water?

Pollution of the Water

Water is one of the essential ingredients of life. The vast majority of living things need it in order to survive. Man needs it to drink as do other animals. Plants need it to aid growth. Almost everything which we manufacture requires water in the process. All of the things which we drink are based on water. We put water in our coffee, tea and other beverages. According to many scientists life on the planet Earth originated in the sea, in uncontaminated water. Nowadays man takes much of his food from the sea and talks about the possibility of farming the sea more thoroughly in the near future. If this is to be practicably

How important is water to life?

possible, then we must do our utmost to preserve the sea and other sources of water and to avoid polluting it in the way that we are now doing. It will then continue to support life. In industrial and urban areas much of the rainwater which we use as drinking water from reservoirs is polluted as it collects all kinds of contamination in the air as it falls and from the land that it runs through. This means that we have to purify it before we can use it and this costs money and time. We must look after our seas and oceans to ensure that life in them continues to survive and prosper in a natural way. But are we doing this?



Without oil civilisation would grind to a halt – with it, we have pollution, dead birds and dirty beaches.

Perhaps the most obvious example of the way in which we pollute the seas is the one

How do we pollute the seas? which we can see with our own eyes—oil pollution. Every year there are countless instances of oil being spilled and discharged, accidentally or on purpose, at sea. The sight of huge slicks of oil on the surface of the water is unpleasant enough. It also fouls beaches, causing thousands of pounds of damage and weeks of time in cleaning-up operations. It is estimated that the staggering total of 3 million tons of oil are washed into the sea by tankers every year. The total increases annually and many spills of oil have had great effect on the natural life at sea. Yet still tankers continue to discharge oil at sea and still accidents occur which could have been avoided.

The form of life which appears to suffer most from oil pollution is sea-birds. The *Torrey Canyon* disaster of 1967 brought this home to many Europeans as it occurred in their offshore waters. Thousands of seabirds died from the effect of the oil, some very quickly but many after lengthy suffering. Less than two years later one of the worst disasters ever took place. Off the coast of California there was a large oil-drilling operation. Quite unexpectedly a massive blow-out occurred and for almost two weeks oil poured out without anybody being able to stop the flow. Over 20,000 gallons of oil entered the ocean each day for twelve days before it was halted. By this time, of course, so much damage had been done. A huge oil slick measuring 800 miles long was found in the

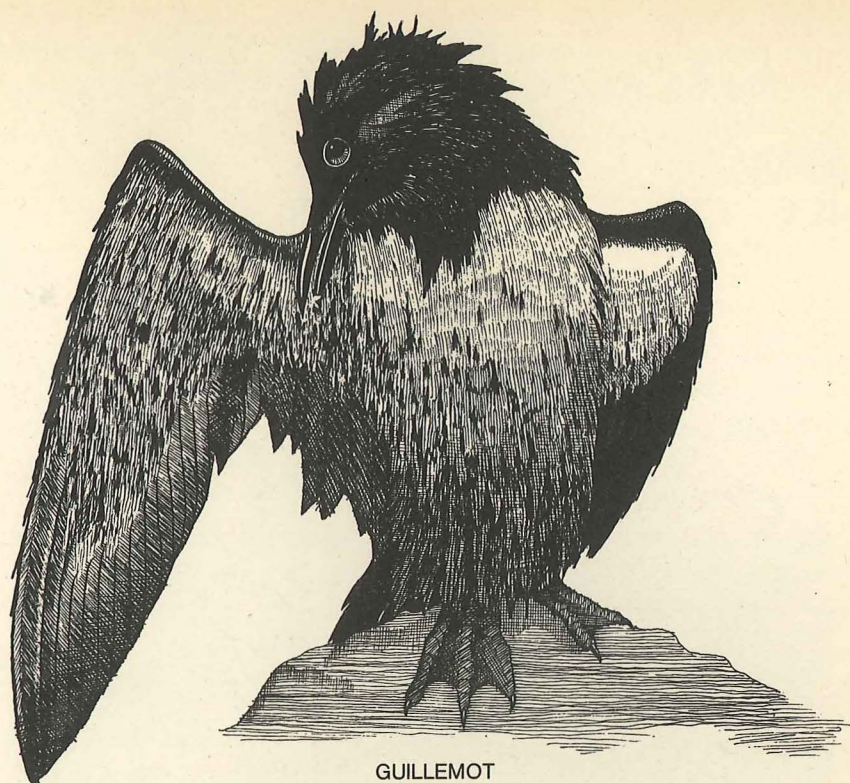
What damage does oil pollution cause? most from oil pollution is sea-birds. The *Torrey Canyon* disaster of 1967 brought this home to many Europeans as it occurred in their offshore waters. Thousands of seabirds died from the effect of the oil, some very quickly but many after lengthy suffering. Less than two years later one of the worst disasters ever took place. Off the coast of California there was a large oil-drilling operation. Quite unexpectedly a massive blow-out occurred and for almost two weeks oil poured out without anybody being able to stop the flow. Over 20,000 gallons of oil entered the ocean each day for twelve days before it was halted. By this time, of course, so much damage had been done. A huge oil slick measuring 800 miles long was found in the



ERDAHL'S



RAZORBILL



GUILLEMOT

Pacific Ocean and countless birds, dolphins and seals were killed as their food was poisoned and their natural waterproof coats were destroyed. Most have no chance of escaping swallowing huge quantities of oil, leading to a miserable and painful death. As if this was not already too much, at the end of the same year another leak happened, not as big as the first but enough to wreak havoc. Before the first accident there had been a population of 4,000 Western Grebes, attractive fish-eating birds, in the area. After the second incident only a few individuals could be seen. The population had been virtually wiped out.

In many cases where oiled birds have been found dead along coastlines the source of the oil contamination has not, however,

How widespread is oil pollution?

been discovered. Possibly the birds pick up the oil far out at sea from small patches of oil—no doubt the whole of the world's oceans are polluted with oil. In a scientific exploration across the Atlantic Thor Heyerdahl discovered that there were particles of oil right across the ocean, sometimes small amounts but at other times huge lumps of thick crude oil. This was unknown until he made his voyage and it leads one to ask if every ocean is in the same state.

Anybody who has ever seen a seabird covered in oil will know how distressing the sight is. The bird cannot fly or dive properly and the plumage loses its waterproofing quality. The bird cannot then catch its food and becomes cold and water-

How does oil kill birds?

logged. Usually birds try to remove the oil by preening and in so doing swallow quantities which poison them.

Dead seabirds can be observed but oil

**Does oil pollution
have other effects?**

pollution has other harmful effects. The

Torrey Canyon disaster caused the death of all the flora and fauna of the south coast of Cornwall. Not only were seabirds massacred but crustaceans, fish, weeds and plant life were all wiped out as the oil invaded beaches. The cost of cleaning up the shoreline for holidaymakers was also quite staggering. Sometimes the effects of oil cannot immediately be seen. Small amounts of tar have been found to increase alarmingly the growth of a polyzoan which is found in the Pacific oyster beds. It is likely that other strange things as yet unknown are being created by oil pollution in the oceans.

Many methods have been used to disperse oil. Often

**How can we get rid
of oil at sea?**

detergents are used but these

can have harmful effects on marine life on their own. Combined with the effects of oil they can cause more harm than good. Fortunately this has now been realised and new substances are being manufactured to deal with the menace. However, with an increasing number of seabirds suffering and dying every year directly from oil pollution, the future does not look bright for them. Very strict laws on a worldwide scale are a necessity and fines must be enormous if these are broken. Oil companies are rich enough to pay the small fines now imposed. Some forward-looking companies now use a new method of cleaning the tanks in their ships. It is known as the 'load on top' method and enables tankers to wash

out their tanks at sea without releasing oil into the water. Ballast is a mixture of tank-washing water and sea water mixed with oil. This is put into a 'slop tank' where it settles, the clean water falling to the bottom. This water is returned to the sea leaving oil with a negligible amount of sea water in it. This oil is called 'lot slops' and the slop tank can be filled at port along with the other tanks, oil being put on top of the lot slops. The method is cheap and should be adopted by all oil companies. Possibly, though, oil reserves will be exhausted or oil will be taken over by a different form of fuel before seabirds disappear completely.

There are other things which pollute water. Although

**Are there many other
pollutants of water?**

nuclear power stations do not

cause much air pollution they pump warmed water which contains less oxygen than is normal into rivers. This can easily upset the natural life cycles in rivers and lakes.

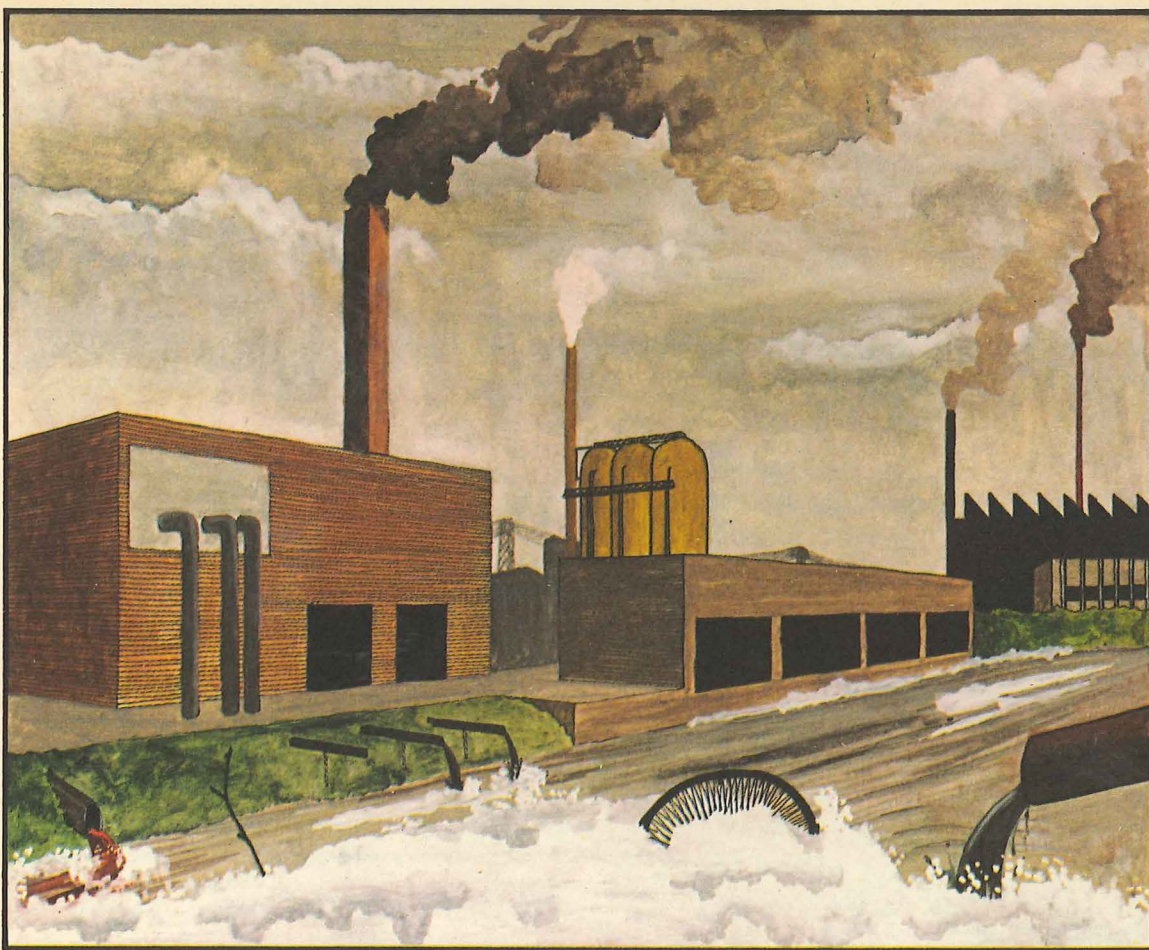
More obviously, the direct pumping into rivers of chemicals, wastes and untreated sewage gives us much to worry about. Harmful chemicals discharged from factories as industrial wastes are even nowadays pumped straight into rivers where they pollute what was once clean water and kill the natural life of the river, so upsetting nature's balance.

In Britain most of the rivers, especially the major ones,

**Are rivers seriously
polluted?**

are polluted. One quarter of them

are seriously polluted, meaning that they support no life whatsoever. Others are very badly polluted and support a minimal amount of life while some are cleaner and hold a better variety of organisms and fish. Only a relatively



Many factories use rivers as the simplest way of getting rid of their liquid waste.

small number are totally free of pollution—and even then for only part of their course. The British Government is to spend £1,300 million in an effort to clean up the nation's rivers before it is too late, but this could have been avoided if we had thought before we decided to pour all of our waste products from industry, and from urbanisation, into the nearest available river or water source. Many of these rivers lead directly into estuaries and inshore waters which are of great importance as sources of food to man. Fish and other animals which are commercially harvested are affected in many

ways by pollutants from the rivers. Yet man still eats these foods, often unaware of the fact that they may be dangerous. Man is in fact eating poisoned food—food which he has himself poisoned! Although this sounds silly it is becoming more and more a fact which has an ultimate bearing on man's own survival.

The far-reaching effects of pumping waste into rivers can be seen in many ways. Most of these are kept from the public for economic and political reasons. Some

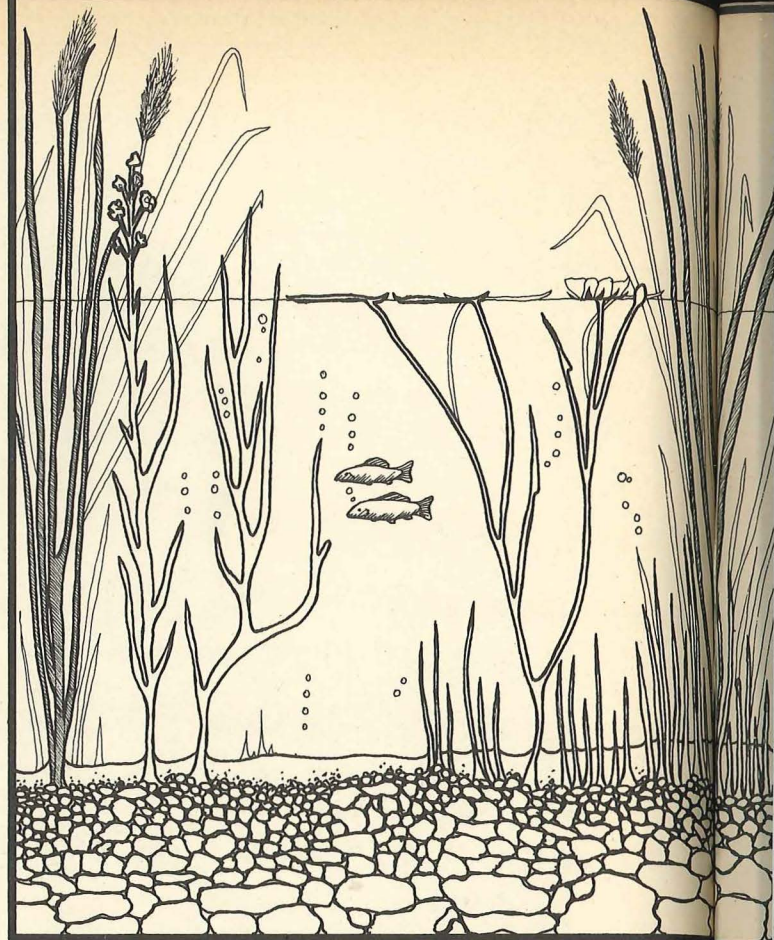
**How do poisons
affect water-life?**

are so obvious that they cannot be. Chemicals known as PCBs, which are used in varnishes and paints and as lubricants, are regularly pumped out into rivers because manufacturers claim that they cannot afford to dispose of them in safer ways. As these highly poisonous chemicals enter the rivers they are carried out to estuaries and then to the sea where currents disperse them. Not only do they kill the life of the river, they also contaminate the inshore life of the sea. These substances have been found in various forms of life. Seabirds, including ducks and terns, are not the only ones to suffer. All kinds of fish and also mussels contain high quantities—and these are animals which man catches and eats in enormous numbers. Man is again consuming poisons which he himself has discarded into the river.

Most of the pollution caused by PCBs

Which parts of the oceans are polluted?

has been discovered in the western world, particularly in the United States and Europe where industry is prominent and where industrial wastes are therefore greater. However, in the middle of the oceans, the Pacific in particular, various seabirds which spend most of their life far out at sea and feed mainly on plankton and small fish were found to have surprisingly large concentrations of PCBs in their bodies. The most likely cause of this is that the poison is carried by the winds out to sea where it settles and is taken in by the plankton. The ocean currents may perhaps carry it from particular sources but this is unlikely in the cases where it has been found since natural ocean currents would have carried it to different places. Much of the surface water of the world is poisoned by PCBs and now, when it is too late, steps are being taken to



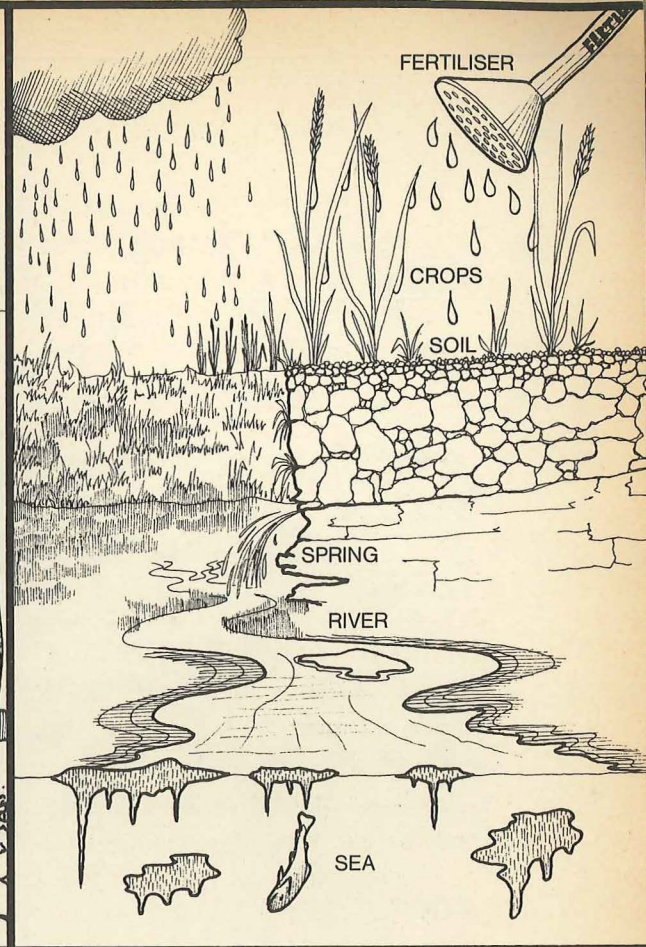
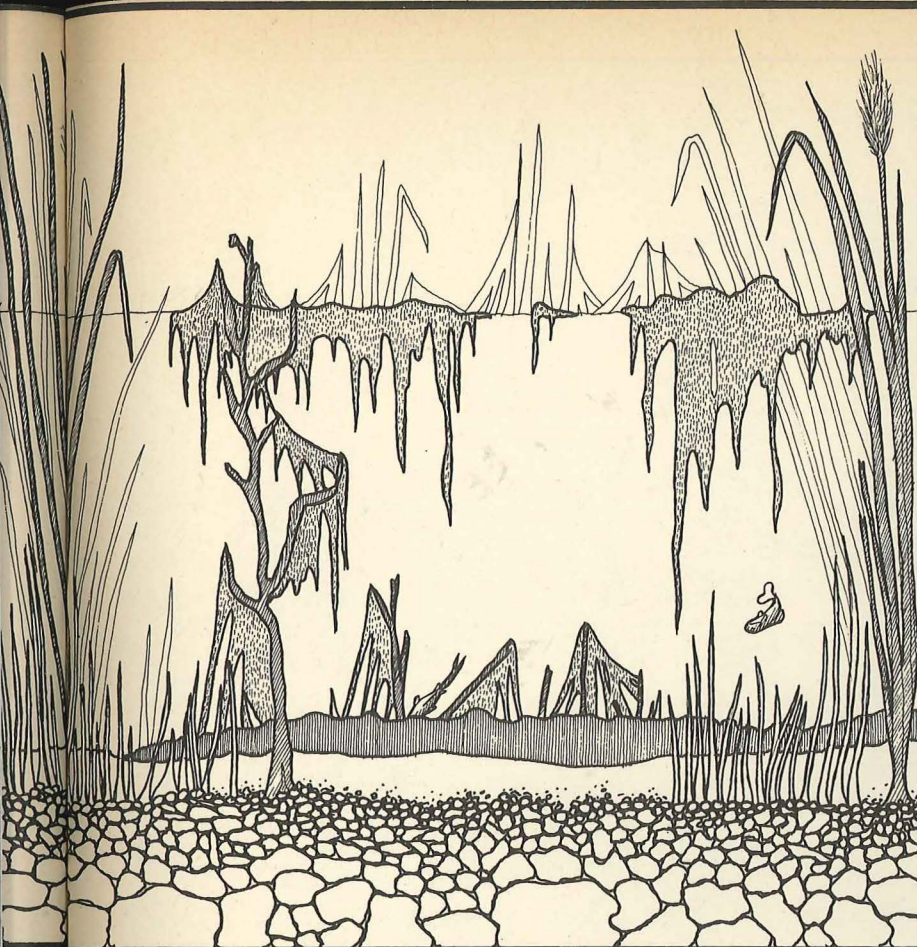
Water pollutants spread everywhere – but even fertilisers

restrict their use. Even so, untreated sewage is still pumped into the sea in millions of tons and this can only have damaging consequences. We do not in fact know what the long-term effects might be of discharging so much waste into the sea. The effects may be the total extinction eventually of marine life. In smaller inland waters and rivers this has already been proved to be the case. What happens is called eutrophication by scientists and biologists.

Eutrophication means that plant life

What is eutrophication?

grows and grows until it stifles all other life. When a lot of untreated sewage and fertilisers enter the rivers and lakes they cause the plantlife that is already naturally present in the water to grow at a far greater rate than it should. It clogs up the water as it increases and finally takes up all the room in the lake or



run off the land and make weeds in ponds grow so much that they clog up and kill the water.

river. Clear water is no longer clear. One can see only just below the surface and the thick vegetation turns the water a green colour. The lake or river becomes old before its time because it gets too much food too quickly. As more and more vegetation grows, it dies and falls to the bottom where it decomposes. This causes a lack of oxygen in the water at the bottom. Normally this would be corrected by nature every year but when there is too much growth and too much dead material gathering on the bed it no longer works. This is a very common result when large amounts of sewage and industrial wastes are pumped directly into clean water and it causes the death of all animal life.

There is another danger to our environment which is possibly even more worrying.

What are 'run-off' pollutants?

This concerns what are known as 'run-off' pollutants. Millions of tons of pesticides and fertilisers are sprayed onto the land every year. These have increased the output of crops greatly but at the same time have had disastrous effects on the environment. Not only have they polluted the land and killed much wildlife but they have also affected rivers, lakes and oceans. What happens is that the poison is carried by winds and washed by rain from the land and into rivers. Chemical fertilisers cause the rapid growth of algae and plankton which stops other life in the water from prospering. Switzerland, one of Europe's richest countries, and once its cleanest, is now one of its most polluted. Lake Geneva has suffered alarmingly from the overgrowth of algae and vegetation and the lake which was once blue is now green. Sewage is poured untreated into lakes, adding to the trouble, and typhoid outbreaks have



Fish affected by pollution are sometimes dangerous to eat and have to be destroyed.

occurred in a number of years recently in some of the country's tourist resorts. Switzerland's lakes and rivers are a source of water for many of the surrounding countries but most of Switzerland's water is now polluted and has to be purified before it can be drunk. When it passes to other countries for consumption it is not cleaned at all and the peoples receiving it have to do this themselves. The river Rhine rises in Switzerland and flows northwards until it reaches the North Sea. But it is unfit for human consumption even before it leaves Switzerland as it has been so highly polluted. In North America the Great Lakes have been destroyed by an over-industrialised society and over-developed economy, caused by over-population. In Switzerland the same is happening.

Persistent pesticides washed by rain into rivers poison fish and other animals and are passed on to man who

eats the fish. Fish-eating birds, such as the Osprey, are seriously affected and often fail to produce fertile eggs. In recent years there have been many cases of fish in rivers being totally exterminated through the high level of pollution in the water. Certain pesticides and fungicides are also poisonous to man and there are some whose long-term effects are not known at all.

Much industrial waste which is poured into rivers contains some of the most harmful

Are metals dangerous?

pollutants. Metals, such as zinc, lead, arsenic and mercury, are widely used in industry and are often discharged as waste directly into waters, because of the difficulty of disposing of them in any other way. Unfortunately this practice is allowed almost throughout the world with terrible consequences. First of all, the metals do not stay in



In Minimata, in Japan, cats and humans died from poisoned fish.

one place but are carried along to estuaries and out to sea. In addition, bacteria in the water cause chemical changes to take place, causing the metals to become even more dangerous in some cases than they normally are. Mercury in particular has caused much alarm. It is widely used as a fungicide as well as in industry and in Sweden was until recently always the agent used to kill fungi. It was not long before naturalists noticed that there were far fewer seed-eating birds in certain areas where mercury was used than there had previously been. Fish were also found to have extremely high levels of mercury residues in them making them quite unfit for human consumption. Much of the country is contaminated and in some regions so badly that fish cannot be eaten. Scientists there are convinced that it will take more than fifty years before life returns to a more natural state and the mercury

disappears from the environment.

Metals do not affect only wildlife. They

What is Minimata disease?

are passed up the food chain from plants or fishes to mammals and man. A warning was given in Japan. In an industrial area on Minimata Bay there were many cats. The Bay held thousands of fish. The first indication that something was wrong was when cats, who ate fish, began to get ill and die. The people also eat a lot of fish in this region. Soon they too fell ill and seventy-eight died. The trouble was traced to mercury in the bay and in the fish. The cats and people living on the fish had contracted mercury poisoning and mercury is deadly to humans. The symptoms are most unpleasant and painful. The metal attacks the brain and the body and will eventually kill both. There is no real cure for this disease often



Chemical waste poured into rivers can affect crops miles and miles downstream.

referred to now as Minimata disease. This all started in 1953 and the source was at last traced to a factory which had been pumping tons of waste mercury into the bay. It has been closed down but even in 1972 people are still suffering from mercury poisoning and babies are being born deformed and with mercury deposits in their bodies. In England mercury has been found at high levels in fish in areas of heavy industrial development and in similar places in America. The eating of fish caught at such places is banned for man's own safety.

Mercury is highly poisonous but so are

**How can metals
affect our food?**

many other metals. Cadmium is one and an example of what it can do to man comes again from the rich, developed nation of Japan. Cadmium poured out as waste from a zinc-smelting plant into a river found its way downstream to less industrialised regions where it contaminated the rice fields. The inhabi-

tants of the area have rice as their staple diet and the cadmium entered their bodies through the rice which they were eating. Soon they began to show strange symptoms of illness, which doctors at first thought was malnutrition caused by feeding only on rice. Further investigation proved that this was not the case. The people had a peculiar disease which attacks the bones and reduces their size. They are often unable to stand up or walk because their bones have become too small to support them. They become gradually shorter and shorter in height and suffer acute pain. The disease is called Itai-Itai—it hurts, it hurts. The cause of this disease is cadmium poison. Minute amounts can cause it. In the area in Japan where this was first noticed half of the land is now contaminated and anything which grows on the land is poisonous to anybody or anything which eats it. In England cadmium has been found in sea creatures in the Severn estuary and cadmium is present in places in many other parts

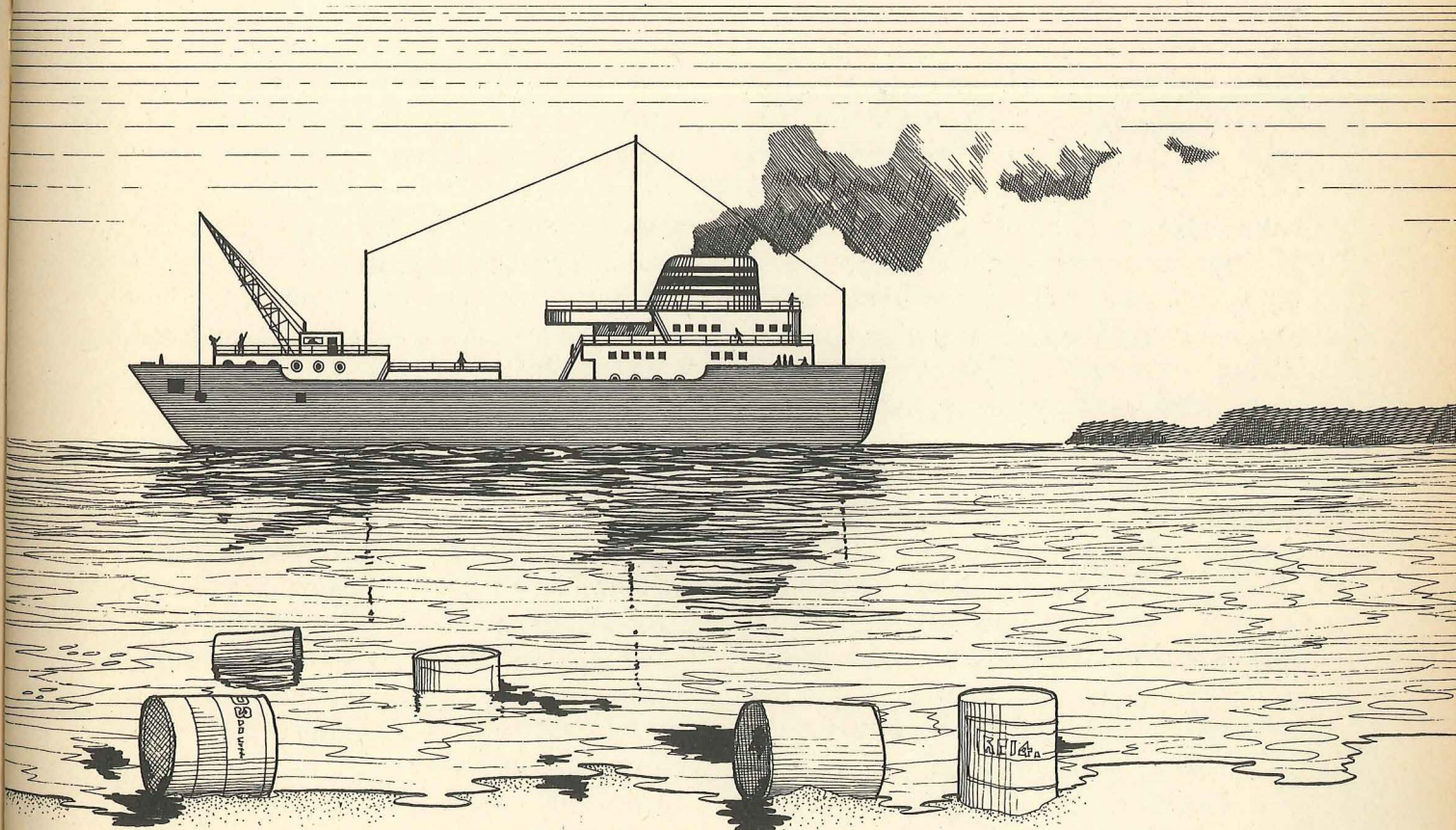
of the world.

These are effects that just two metals can have separately. Combinations of metals may well have even worse effects—and combinations of three or four poisonous metals have been found in dead seabirds on many occasions. Even now, after the examples in Sweden and Japan, other countries still follow the same course when disposing of industrial wastes and still use mercury as a fungicide. The combination of pollutants pumped directly into watercourses and those which are washed off the land by rain into rivers is a highly dangerous one to all plant and animal life, including man.

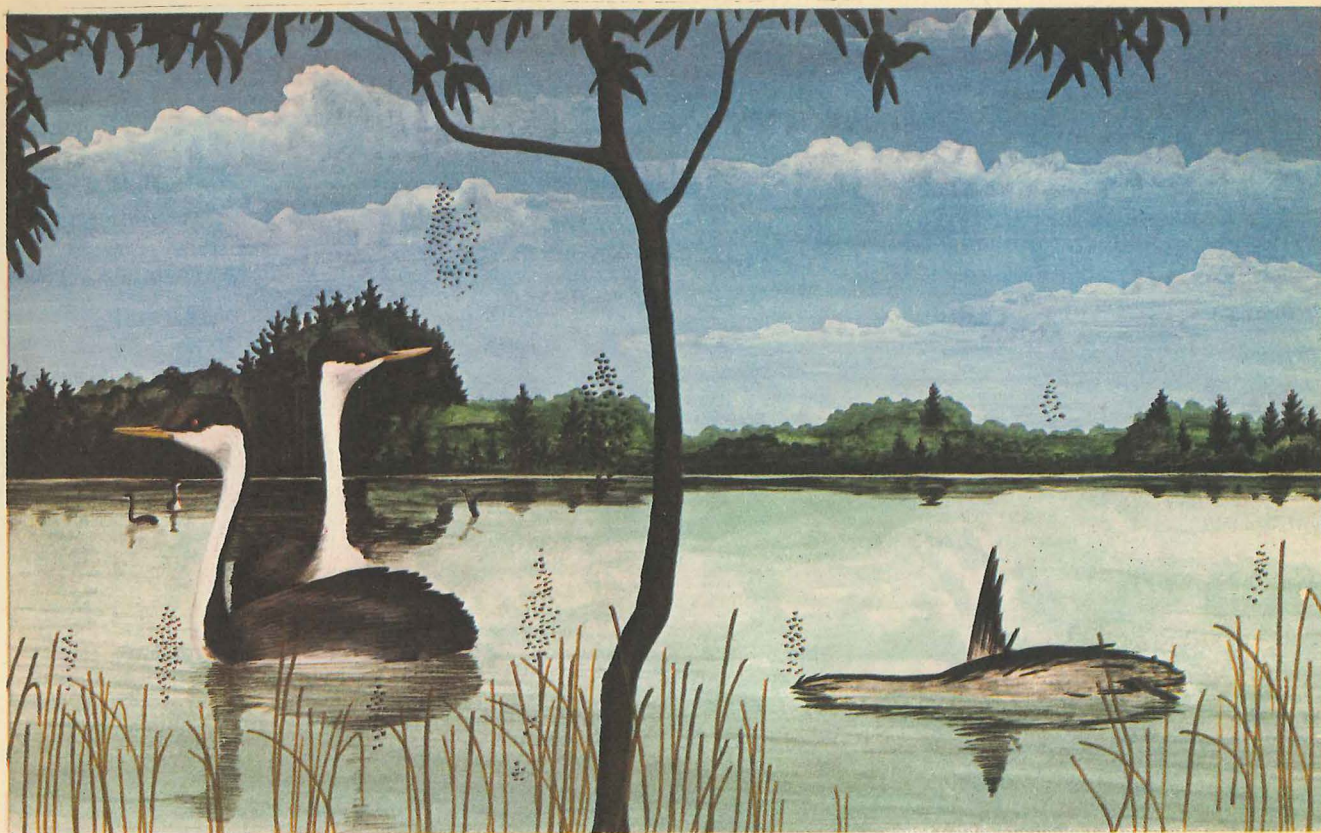
Another example of man's shortsighted and ignorant attitude towards his environment is seen in the direct dumping

Is dumping at sea safe?

of waste out at sea. As we use up all the available space on land we assume that we must take our waste out to the ocean and dump it there. Not only is sewage and household waste dumped but even such dangerous things as nerve gas and radioactive waste products. Those responsible for this claim that the canisters in which these lethal materials are sealed will not be eroded by the sea waters for hundreds of years, by which time the contents will no longer be harmful. This is a very shortsighted outlook especially as we do not yet know enough about the possible effects on such materials when exposed to the conditions on the bottom of the oceans. An added danger is that of underwater explosions, both natural and man-induced. In one year the United States dumped over ten million tons of waste into the oceans.



In desperation dangerous chemicals have been dumped in the sea in sealed containers. They often come ashore miles from where they are dumped.



The spraying of Clear Lake with DDT only got rid of the midges for a short time. What it did do was kill hundreds of Western Grebes.

Man destroys his planet's natural life in many ways, sometimes in an obvious way and sometimes in a more subtle way. One of his most obvious mistakes took place in California. A large lake—strangely named Clear Lake—was the habitat of many midges which carried no diseases but were a nuisance. It was decided to spray the lake with DDT, a mild but persistent insecticide. This got rid of the midges for a short time but they returned again and more of the insecticide was sprayed over the lake. The lake was also the home of a thousand pairs of Western Grebes. That is, it was before the spraying. After the second spraying the grebe population had fallen to as few as 30 pairs! The first thought was that the birds had been affected by a disease. Many scientists, though, were not satisfied

with this explanation and started research to find out the real cause of the birds' deaths. They found that they had been poisoned by DDT. When this had been applied it was in small amounts and of a very low level of concentration. But it had passed to the plankton where it increased in concentration, from the plankton to fish, where it again multiplied, and from fish to the grebes which fed on them, where it again was multiplied. By this time it was sufficiently concentrated to kill the birds. It would also perhaps have killed man if he had eaten enough of the fish himself.

This is an example of how persistent pesticides are concentrated as they pass along the food chain. The longer the chain, the more concentrated they become. We should never forget that at the very end of the chain is man. It has been found in many animals that if the

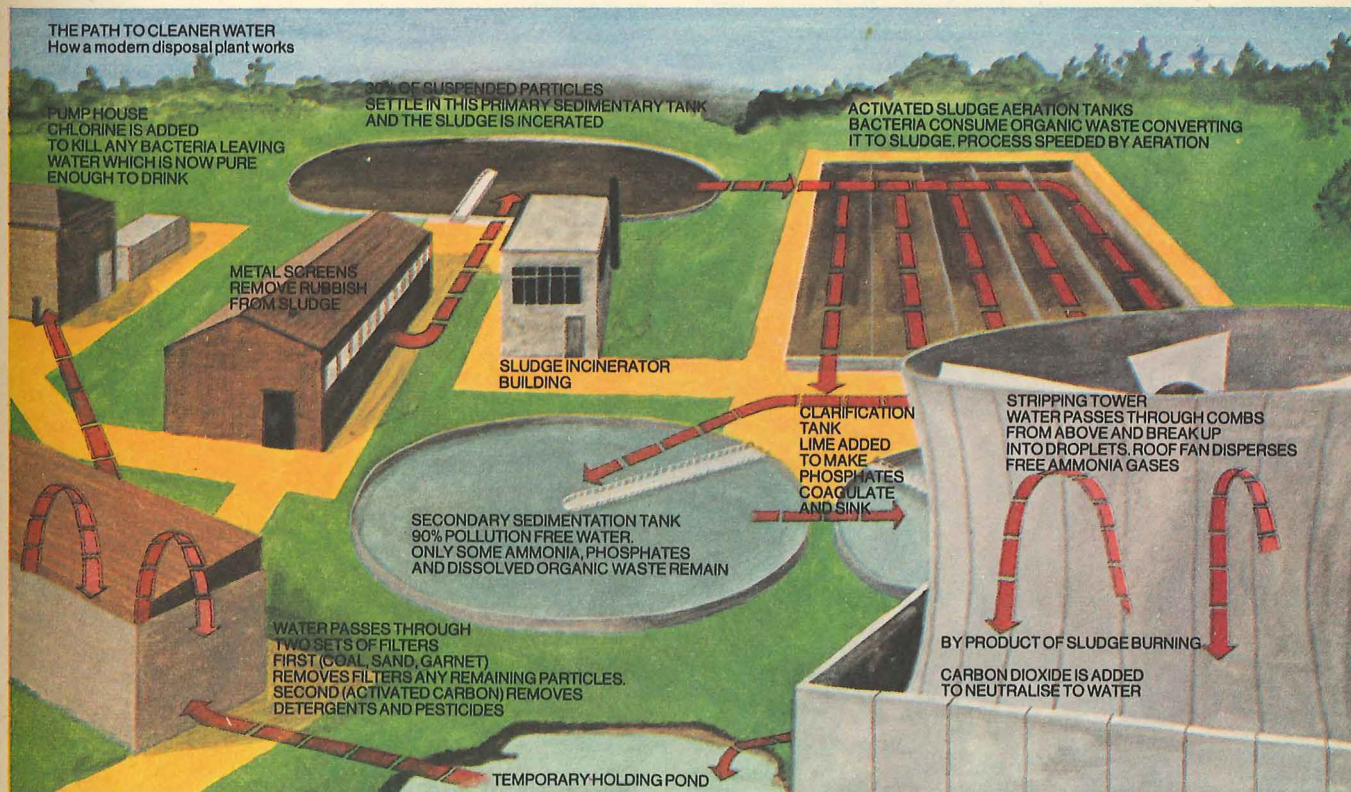
poisons do not kill they usually have a great effect on fertility, making breeding impossible. They could well eventually have the same effect on man.

Tests have been made all over the world and everywhere present. In the far north in Canada animals and plants have been poisoned and in the Antarctic penguins have poison in them. In neither of these two areas are pesticides used and man does not live there. The pesticides have reached these places through being carried on the wind and by ocean currents. No place in the world is safe any more.

In developed countries almost all rivers are to some extent polluted and becoming more so in many cases. The rivers flow into estuaries where fish are

harvested for man to eat. Almost three quarters of the world's surface is ocean and the oceans are highly polluted. Before long all the food which we take from the water will be unfit for our consumption if we continue with our policy of using poisonous substances without thinking of their effect and of pouring out our wastes into the convenient rivers and bays which are always close by.

By cleaning up and conserving our waters and the natural life that exists in them we are doing no more than protect ourselves in the long run from the harmful effects that our actions now have on other forms of life. Water is important to us if we are to survive—a fact we should never forget but one which we often seem to ignore.



Complicated water purification systems are becoming more and more necessary as the water becomes more and more polluted.

The Future of Planet Earth

We are now changing the nature of the planet. One

How dominant is man on Earth?

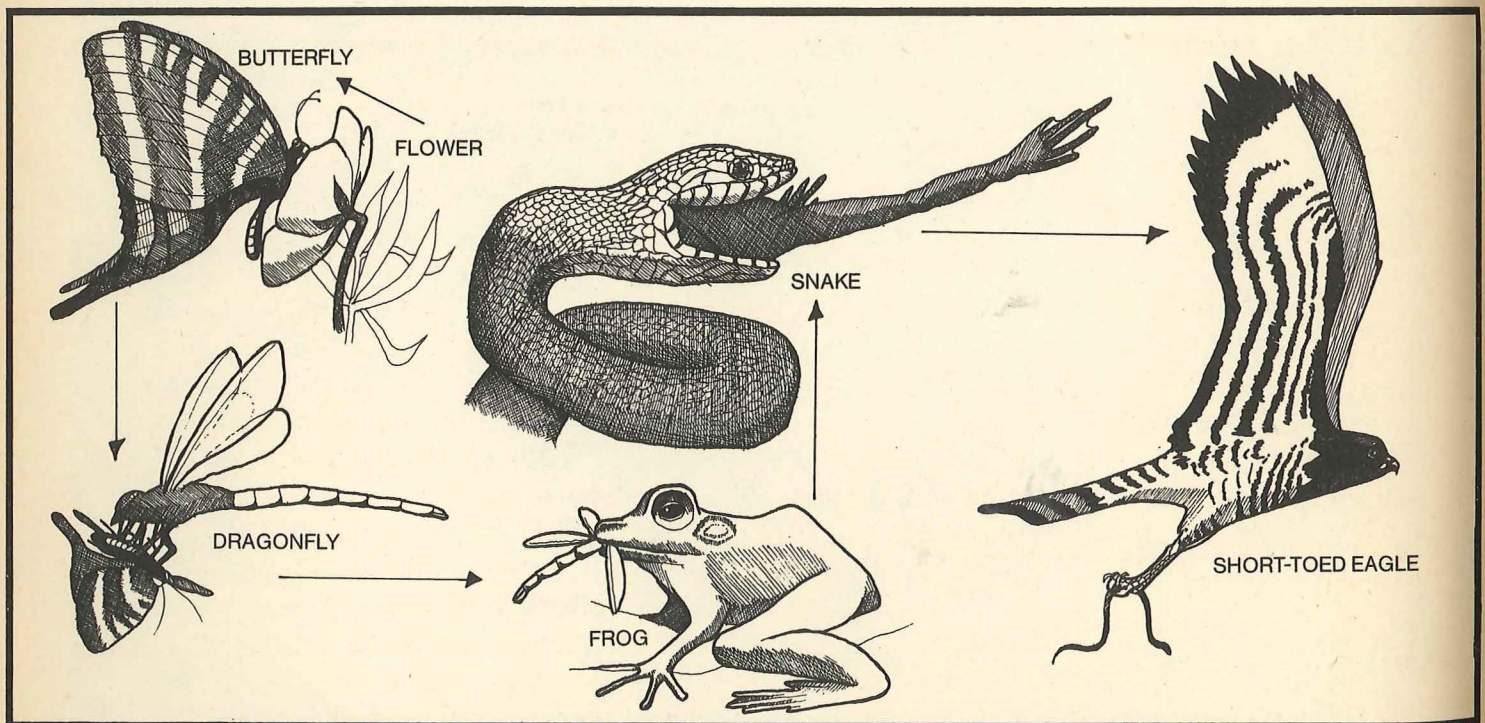
species of life on Earth is becoming overpowering and has the means and some of the knowledge necessary to take over the planet. Man is, however, not all powerful in this field, even though he often believes that he is. His actions do, indeed, alter life on Earth, but usually this is in a way which he does not really want. It seems that all man's new, important discoveries lead only to a worsening of his happiness and satisfaction with life. This is strange because the new technological age was supposed to make life better. It has only made life as a whole worse.

We are still making the same mistakes

Can man survive?

as we have done in the past. We have upset the delicate balance of

nature and destroyed many animals. This not only is a great loss from a point of view of enjoyment of nature and its beauty, it leads also to the extinction of other forms of life which depend on those that we have destroyed. If we destroy predators we are left with no natural control over their prey. For example, harmful insects and rodents are kept at a level which will not worry man too much by various species of birds. But if we kill the birds by poisoning their food with pesticides we have lost control. The pesticide often does not kill the insects, or at least does so only for a short time until they become resistant to the pesticide so they still exist and grow in numbers. So we use more and stronger pesticides to kill them and succeed only in quickening the process of extinction of many forms of life, often including ones which we wish to save.



The interdependence cycle of animals and plants in their specific habitats is upset by man's interference.



Fertilisers and insecticides aren't the only destroying forces. Soil is made less rich and animal habitats are destroyed when forests are cut down; and hunting has made many animals nearly extinct.

By changing the nature of our landscape and by continued and repeated burning of

Should we alter the landscape?
forests to make way for other things we cut back the variety of living things. This brings its own problems and helps to make the soil less rich and therefore less productive and useful to man. It is also, of course, one of the principal causes of extinction.

Hunting is in some parts of the world a major factor in killing off animals, such as the large mammals of East Africa, a unique area of the world. It is quite illegal but the offenders are difficult to catch in such vast areas.

What effect does hunting have?

There are a number of ways in which we can try to halt the downward trend. They all

involve a complete and universal control of the human population and a strong change in our attitudes towards the planet. All governments of the world must rethink their present policies and realise that the Earth is not the property of man alone and is also not limitless. They must put the environment before economic and industrial expansion. They must ensure that the laws that control pollution are enforced to the letter. Very heavy fines and/or imprisonment should be imposed on those who break them—such as factories who discharge waste products into rivers, and oil companies whose

How can man improve the planet?

can try to halt the downward trend. They all



There are so many things that pollute our society – wouldn't it be nice if we could throw them onto the bonfire?

tankers pollute the seas, by accident or not. Education, especially of younger children who will inherit the sort of world we leave behind, is also very important.

The individual can do a great deal.

What can the individual do?

Governments can pass laws concerning things outside the control of the average man but the individual in turn can obey the laws and go further in many cases. He can avoid driving cars in big cities, use the absolute minimum power to reduce the demand on power stations. He can refuse to use plastic and such-like materials unless they are absolutely

necessary, as these cannot be put back into the Earth as food for it. He can avoid damaging wildlife by fires, not use persistent chemicals such as DDT as pesticides, not use artificial fertilisers and keep his use of detergents to a minimum. Basically he must not think of the planet as an enormous rubbish dump, but more as a valuable possession that he enjoys on trust.

Nuclear power may solve some of our

Is nuclear power the answer?

problems. Unfortunately it cannot solve them all. Although it does not pollute the environment as much as other power

plants do, it has the added disadvantage of radiation, which produces cancer. Uranium used in nuclear power gives off radiation and if one little mistake occurs in a nuclear power plant radiation can escape into the atmosphere. If a medium-sized accident takes place the effects are felt for hundreds of miles around and one million people could be killed and even more could be given cancer. Small accidents have already occurred and there is no way of knowing when others will happen.

In Hiroshima, where the first atom bomb was dropped in 1945, people are still suffering and still contracting cancer from the radiation which is still present in the environment there. In Colorado,

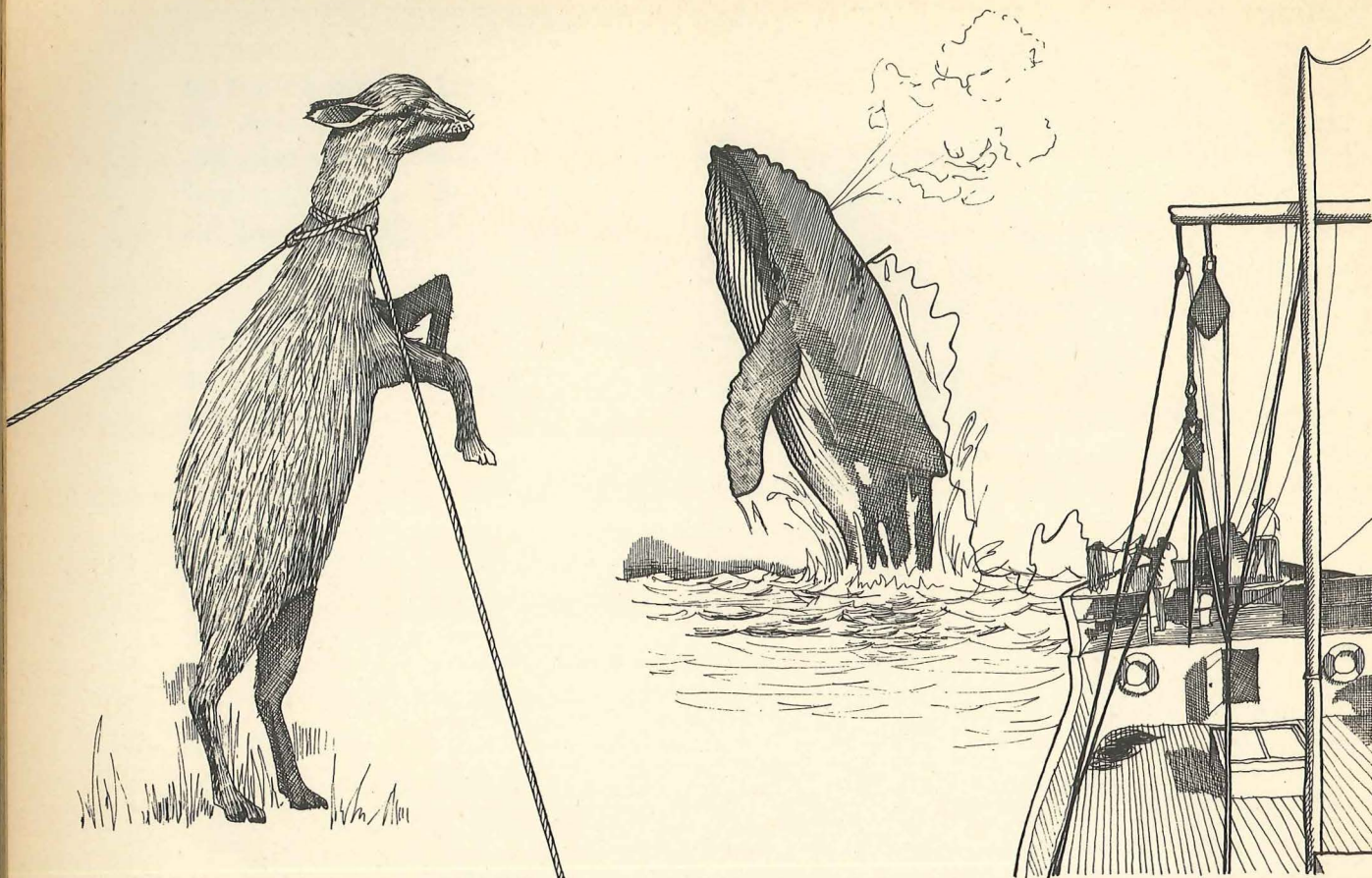
What does radiation do?

USA, forty to seventy per cent of miners working in uranium mines died of lung cancer over a certain period of time. It is no good to hope that we could make all power plants safe because man is a fallible creature and often does not realise the error of his ways until it is too late.

If there is no change in man's general attitude and in his actions the future of the Earth looks gloomy indeed. With an even larger population than we have now the Earth will not support man for long at his present standard of living. Underdeveloped countries will have no chance of improving their standard of living to any noticeably higher level. Not only that but the countries which are now rich will find their standard of living declining. As



As the population rises, the high standard of living enjoyed by some of the world's population will fall, and the underdeveloped countries will have no chance of improving their very low standard of living.



No matter how rare they get, man still goes on killing the Earth's wildlife.

the Earth's raw materials run out and the population rises, so standards of living must inevitably drop.

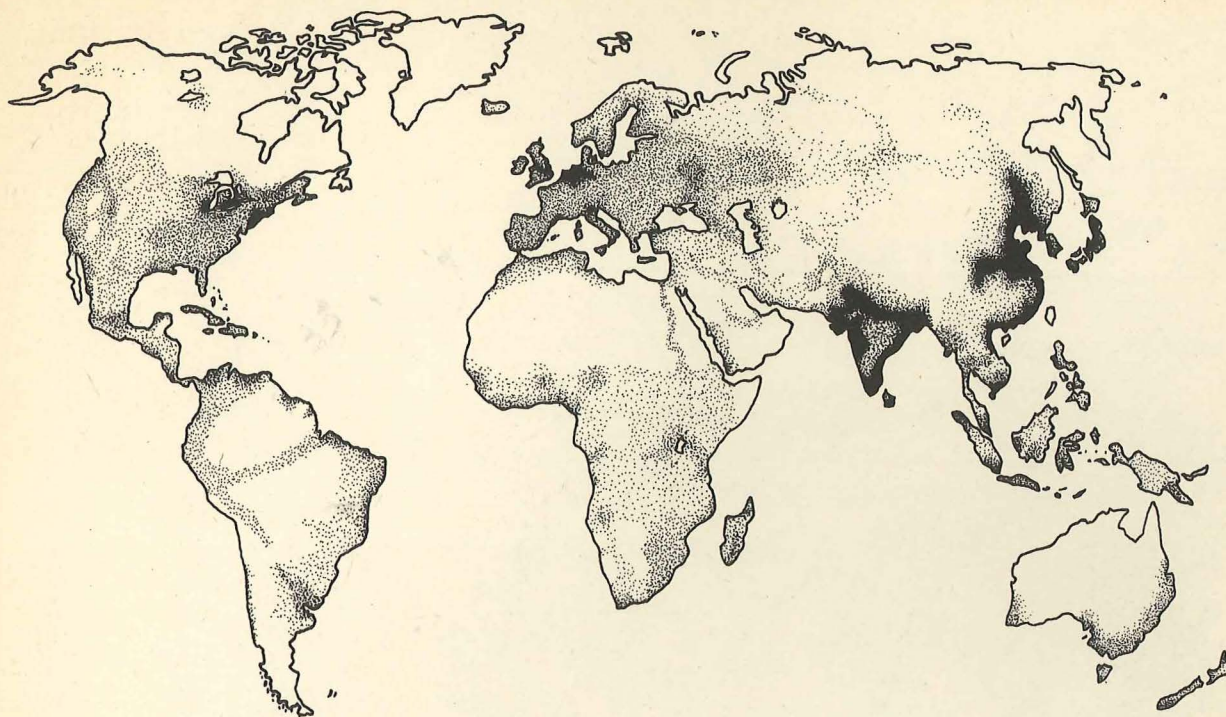
Pollution, as it increases, may cut the population, as may shortage of food. In urban areas overcrowding will cause the breakdown of societies through the physical and mental troubles which accompany it.

What we have now is a planet which is

Can the Earth survive?

rapidly being poisoned and whose wildlife is slowly, and in some cases rapidly, being exterminated. For example, the Vicuña, a South American animal, numbered 400,000 ten years ago. It has been extensively hunted for its fur,

which produces very delicate and expensive fabrics. Now there are only 10,000 left and these will soon disappear unless protection laws are enforced. Over-fishing for a growing population and for profit is also harmful. Most species of whale are in danger of extinction if we do not leave them alone. Surely all our wildlife deserves protection? Much would die without it. We enjoy the beauty of nature and its loss would be greater than we could ever imagine. Every form of life has its part to play and the loss of one kind of animal or plant makes the world a little less rich, a little less interesting and a little more lopsided. And the loss of vegetation means that much less oxygen is being released into the air. Man cannot live with-



THE CONCENTRATIONS OF POPULATION
ON THE EARTH

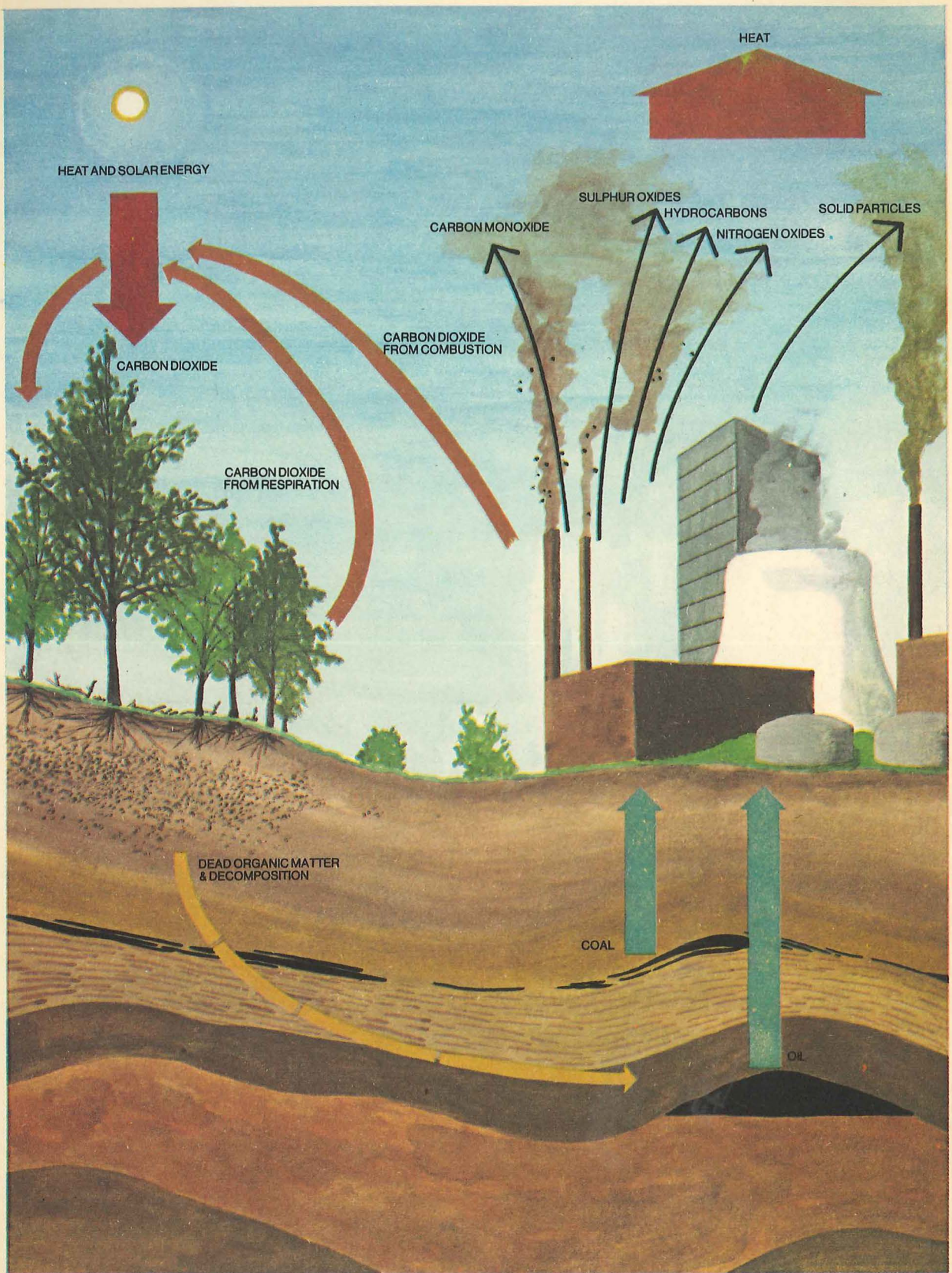
The world's population.

out oxygen. The destruction of the soil means firstly the loss of natural food and man cannot live without food. Secondly it means the loss of other forms of life and eventually man himself.

The importance of preserving the planet in a healthy state and recognising the danger of ignoring warning signals given by nature must be realised by man if he is to continue to survive. There are many bodies concerned directly with conservation and anti-pollution. These do a good job but are limited in what they can do and need the support of everybody. It is the duty of every man to preserve the planet which supports him and to preserve all the forms of life on that planet.

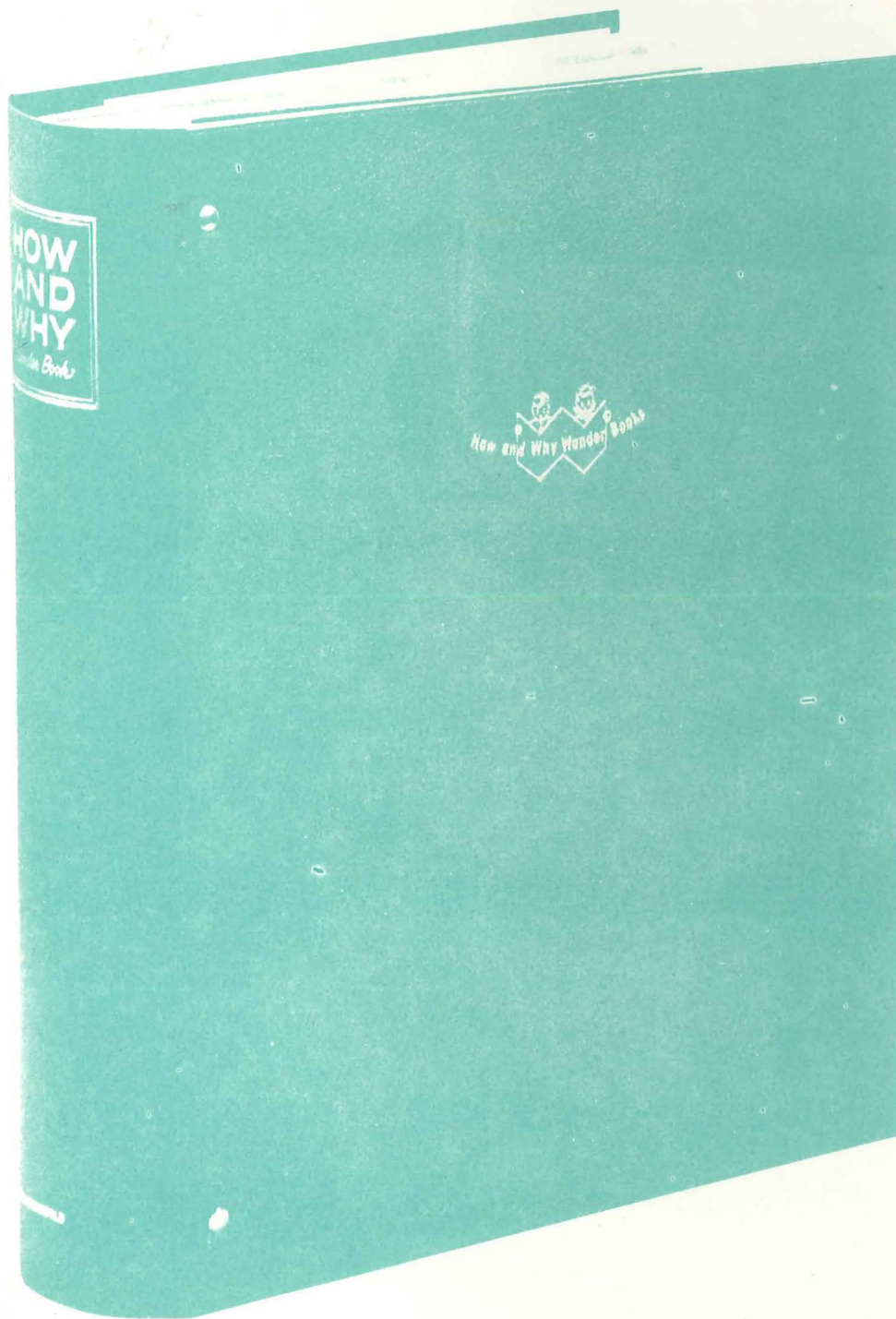
In conclusion the problem of

conservation and pollution is one of caring for planet Earth as the only habitat of man—and of all Earth's life. Ultimately every form of life depends on every other form. If we can control our population and accept many changes in our way of living then we still have time to save Earth. We must accept that we cannot expand any more and that we cannot take any more of the Earth's resources at the rate we now are. We must stop destroying the soil, the plants and the animals. We must stop pouring wastes into the environment. If we all work together as one then we can preserve our Earth for all life—and for future generations of all life. If we ignore the warnings given by nature we may well destroy ourselves.



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